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Psychological Bulletin

PROGRAM

FIFTY-SECOND ANNUAL MEETING*

of the

AMERICAN PSYCHOLOGICAL ASSOCIATION

Hotel Statler, Cleveland, Ohio

September 11 and 12, 1944

Monday, Sept. 11, Morning Session†

9:00 A.M. *Graduate and Professional Training of Psychologists*, EDWIN R. GUTHRIE, *Chairman*. Open meeting of the *American Psychological Association Committee* on this topic. The agenda follows:

1. Job analysis of the actual functions of psychologists.
2. Licensing and certification.
3. Basic undergraduate preparation.
4. Evaluation of professional work done by psychologists in Army, Navy, or civilian agencies during the emergency.
5. Survey of present training facilities.
6. Regularization of practicum facilities on a national scale.
7. Possible recommendation of department specialization in graduate and professional training.
8. Dissemination of added information about opportunities for professional employment (in connection with the Office of Psychological Personnel).

* Except for the business meetings on Tuesday afternoon, all sessions will be held jointly with the *American Association for Applied Psychology* and Section I. Psychology of the *American Association for the Advancement of Science*. Professor CALVIN S. HALL of Western Reserve University is in charge of local arrangements.

A central agency has been established by the AAAS for handling room reservations for the Cleveland meetings. Members should address their requests to the *Cleveland Convention Bureau, AAAS Meeting, 1604 Terminal Building, Cleveland 13, Ohio*, specifying 1. three choices of hotels, 2. price of room desired, 3. time of arrival, and 4. time of departure. Members are urged to "double up."

† The Program Committee had hoped to schedule a symposium on Psychology and the War. However, it developed that much of the necessary material was restricted and that some of the participants selected could not attend because of military duties.

10:30 A.M. *Address of the President of the American Association for Applied Psychology.*

ALBERT T. POFFENBERGER. *PSYCHOLOGY: ACADEMIC AND PROFESSIONAL.*

Address of the President of the American Psychological Association.

GARDNER MURPHY. *THE FREEING OF INTELLIGENCE.*

Monday, Sept. 11, Afternoon Session

1:30 P.M. *The Problems and Values of the Proposed Reorganization of Psychological Societies.* ROBERT M. YERKES, *Chairman.*

4:00 P.M. *Special Sessions*

For discussion groups, meetings of special-interest groups, and business meetings of sub-groups. Groups should arrange their own programs, notify their own participants and contact CALVIN S. HALL regarding meeting places.

Monday, Sept. 11, Evening Session

8:00 P.M. *Address of the President of the American Association for the Advancement of Science.* ISAIAH BOWMAN.

Reception of the American Association for the Advancement of Science.

Tuesday, Sept. 12, Morning Session

9:00 A.M. *Psychology and Post War Problems,** CALVIN P. STONE, *Chairman.*

1. Post war psychological problems relating to radio and television, FRANK N. STANTON, *Vice President,* Columbia Broadcasting System.
2. Educational acceleration and post war scientific leadership, SIDNEY L. PRESSEY, Ohio State University.
3. Psychological adjustments of discharged personnel and their families, CARL R. ROGERS, Ohio State University.
4. Occupational and vocational counseling of military and civilian personnel during the period of post war demobilization and the years immediately thereafter, C. L. SHARTLE, War Manpower Commission, Washington, D. C.

* Organized by Calvin P. Stone and Donald P. Marquis.

5. Expanding opportunities for women psychologists in the post war period of civil and military reorganization, FLORENCE L. GOODENOUGH, University of Minnesota.
6. Opportunities for the expansion of psychological services and research in colleges of agriculture and engineering, H. H. REMMERS, Purdue University.

Tuesday, Sept. 12, Afternoon Session

1:00 P.M. *Business Meeting of the American Association for Applied Psychology.*

2:30 P.M. *Business Meeting of the American Psychological Association.*

In addition to the usual business, the Committee on the Constitution will report recommendations based on the mail vote on the amended By-Laws for whatever action is desired.

Tuesday, Sept. 12, Evening Session

8:00 P.M. *Joint Meeting of Sections I, Psychology and Q, Education, American Association for the Advancement of Science.*

Address of the Vice President of Section Q.

HAROLD CLARK. *HOW FAR IS EXPERIMENTATION IN THE SOCIAL SCIENCES POSSIBLE?*

Address of the Vice President of Section I.

EDWARD C. TOLMAN. *A STIMULUS—EXPECTANCY NEED—CATHEXIS PSYCHOLOGY.*

ELECTROENCEPHALOGRAPHY: REVIEW OF 1942*

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There has been a progressive interest in electroencephalography since its introduction as a practical technique in 1929 in Europe, and in 1934 in this country, until now more than eight hundred articles have appeared on a wide variety of its uses. Some of the general presentations, usually for the benefit of the practicing physician, have been rather over-enthusiastic as to the immediate value of the electroencephalogram in precise clinical diagnosis (**3, 22, 58, 99**), but there have been a number of more conservative summaries of electroencephalograph status in various fields (**1, 21, 33, 76, 77, 78, 79, 80, 82, 83, 84, 85, 86, 88, 89, 90, 93, 94, 95, 96, 98, 100, 101**). The excellent comprehensive reviews by Jasper, up to 1937 (**91**), Davis, 1937 through September 1938 (**81**), and Jasper, September 1938 through 1940 (**92**) have covered the literature of these periods very fully. Lennox has reviewed the 1941 work on electrophysiology and epilepsy (**45**). The Gibbs "Atlas of Electroencephalography," (**87**) and the chapter by Jasper in "Epilepsy and Cerebral Localization" by Penfield & Erickson (**97**), are outstanding contributions to an understanding of two slightly different interpretations of electroencephalograms.

Electroencephalography is a method of recording the continuous changes of electrical activity in brain tissue by conducting the minute impulses through an amplifying system to an ink-writing or photographic unit where the fluctuations in potential are expressed on a moving tape. An ink-writing oscillograph has obvious practical advantages now that certain mechanical difficulties have been somewhat controlled. It has been accepted that recordings from the scalp are essentially similar to those direct from the cortex, so that in most work small metal discs on the scalp are the electrodes used (**12**). Methods of recording, analysis, classification, and interpretation are still in a state of flux. Bipolar recordings, from two electrodes approximately equidistant from the cortex, and monopolar recordings, with one of the two electrodes over a relatively inactive area, are both used. To indicate general frequency range of waves, the terms alpha, beta and delta are often used, but because of the false sense of precision that this engenders the terms are avoided by some workers. The alpha index, and delta index, based on the percent of time occupied by these waves, and detailed analysis of amplitude are being applied to a variety of material, but there seems to be little evidence of relationships between specific wave types and clinical symptoms, although trends as groups are evident. The use of the Fourier transform to obtain a frequency spectrum is being continued in order to determine quantitative measures on large populations in an effort to establish certain norms (**32**). A similarly motivated attempt to quantify data has been made with the cycloscope, an instrument developed to study short-sequence, quasi-periodic phenomena (e.g. sun-spot cycles) and now applied to the electroencephalograph (**11**). A method has been suggested of graphing results to make

* With a supplementary bibliography to September, 1943.

them more available for direct comparison with other records, so that the record to be diagnosed may be set against records from verified cases, and by noting the amount of delta activity, and degrees of bilateral difference in it, purely empirical conclusions may be drawn (67).

The electroencephalogram (EEG) reflects changes in cortical activity which vary widely during the growth of the individual and the normal shifts of his activities and environment, as well as under abnormal damaging conditions. Fetal EEG's have been recorded in the seventh and eighth months of pregnancy which were similar to post-natal records from the pre-central region of the same individual (49). The increase in frequency and stability of cortical potentials in monkeys which seems to parallel the anatomical and functional growth supports earlier reports on this aspect of developmental changes (41). The cortical frequency spectra of twenty healthy adults as determined by the Fourier transform show that although certain areas tend to beat at particular frequencies, any area can beat with the same rhythm as any other, and that although one area may act as a pacemaker for a given frequency range, the pace-maker effect has no fixed cortical localization and is not constant in behavior. There tend to be variations in energy distribution and in peak frequency between different areas and between homologous areas, with the area having the fastest peak frequency also tending to have the highest peak (32). A driving effect on cortical activity has been demonstrated by intermittent photic stimulation of monkeys, in which the cortical potential amplitude was increased, particularly at 10.5–11 per second frequency, and the rhythm st[illegible]zed (38). Simultaneous electroencephalographic, sweating and blood pressure reactions to a variety of stimuli confirm earlier work that beta potentials increase and alpha potentials decrease following stimulation (15).

Variations from approximately 10 per second waves, particularly toward the slower, higher voltage side, are considered abnormal, the exact limits of such abnormality varying according to different investigators. Such a pattern is believed often to be an inherited constitutional inferiority which is non-specific but tends to be associated with instability. The incidence of abnormality in different groups may be reduced by selecting them on criteria which have no apparent relationship to the EEG. For example there is a decrease in the per cent of abnormal records from groups of epileptics, to post-traumatic cases, to psychoneurotics, to Army personnel, to fliers, (74). The abnormal rhythms are also associated with such factors as age, blood flow, blood chemistry (particularly the concentration of sugar, carbon dioxide, and oxygen), presence of drugs, and state of consciousness. These mechanisms and their interrelations are not yet clearly understood.

The possibility that the presence of so-called abnormal slow delta

activity may be in part a function of age is brought out by a study of the hyperventilation effects in two hundred diversified records. It is known that the spontaneous cortical activity shifts from large slow waves in infancy to a basic adult rate of approximately 10 per second around the time of puberty. It is now shown that the appearance of delta activity with hyperventilation is also related to age in both epileptic and non-epileptic subjects, the amount of delta decreasing rapidly up to 15–18 years of age, more slowly to 35 years, and showing little change beyond that age. In idiopathic epilepsy, although the amount of spontaneous delta activity is similarly related to age, the absolute amount may vary in different situations (48). A period of hyperventilation is usually included in the standard exploratory EEG since it is known that over-breathing tends to induce or accentuate abnormal waves, particularly in epileptic patients. Since lowering the blood sugar may increase the incidence of abnormal waves, it is important to keep it above 120 mg. per cent to eliminate this as an additional variable in comparative or diagnostic studies (64). How hyperventilation produces a dysrhythmia remains to be determined, but there is evidence that a tendency to dysrhythmia is related to age (5, 48) and hereditary factors (46), with hyperventilation acting to exaggerate an existing dysrhythmia or to release a latent pattern, possibly because of a disturbance of the carbon dioxide regulating mechanism, or an increased sensitivity of cerebral tissue to changes in blood constituents.

Cerebral vasoconstriction, occurring with hyperventilation, seems to be important in the appearance of slow waves, but just how it acts is still debatable. It may be the lowering of oxygen and sugar supplies to the brain, because of the constriction (17), or it may be the failure of the vasoconstrictor mechanism to maintain the carbon dioxide at an adequate level (36). That vasoconstriction is not the whole explanation is clearly indicated by work on cats in which the injection of an acid causes dilation of the pial arteries and alkali causes constriction, but, unless the pattern is already abnormal, the EEG is not affected by less than near-fatal doses (52). The belief that both oxygen tension and blood sugar are important in determining the electrical activity of the cortex is further supported by experiments on cats and rats in which it is shown that the effect of anoxia is greatly increased during insulin shock, and that the tendency to develop slow waves with hypoglycemia can be offset by inhalation of pure oxygen (31). Abnormal EEG's have been found in a series of varied cases in which the neuropsychiatric symptoms were attributed to interference with the oxygen supply to the brain, or to inadequate carbohydrate metabolism in the brain (20). In Addison's disease the records of many patients showed very slow alpha waves, reduction in amount of beta and unusual sensitivity to hyperventilation, and these characteristics were not affected by most therapy,

although adrenal cortical extract and intravenous glucose reduced the sensitivity to hyperventilation in some cases (**40**).

During various stages of thiamine deficiency in pigeons, the cortical activity showed an initial facilitation of discharge and then depression, somewhat similar to the sequence of changes seen in acute oxygen failure and in insulin convulsions and coma where the mass discharge of the brain is facilitated in the initial phases of metabolic deficiency, before generalized depression of activity occurs. A change toward the normal wave form occurred a few hours after the administration of thiamine, but took ten to seventeen days of normal diet to completely return after extreme deficiency had been produced (**69**).

The appearance of slow waves has been observed in many types of impairment of consciousness, and has even been suggested as an objective, accurate measure of the state of consciousness, but in several patients with hyperactive carotid sinus reflex it was possible to record an EEG from consciousness to unconsciousness (produced by digital pressure), and back to consciousness again without noting any slow waves. The changes which did occur were toward the faster and lower amplitude records during syncope, and occur in normals and epileptics under similar digital pressure, but are less marked. In another case carotid sinus compression precipitated Jacksonian seizures simultaneously with delta waves in the EEG, suggesting that a local discharge may result from cerebral suppression without being associated with any other cerebral dysrhythmia (**55**). The incidence of abnormal EEG's is greater among those with hypersensitive carotid sinus reflex than among normals (**35, 20**). The variation of results concerned with syncope indicates that it is not a simple mechanism, and there are undoubtedly several different types which have not yet been recognized.

Patients with uncomplicated migraine have normal EEG's when headache free, but during attacks they show changes after hyperventilation. Histamine induced headaches were not found to be associated with abnormality in the EEG (**68**).

Some previous investigators had suggested that an enhancement of the basic alpha rhythm followed the use of sedatives, but in a recent study on young dementia precox patients this was not seen after the intravenous injection of sodium amytal. Instead there was a shift to approximately 20 per second waves, which is not specific for barbiturate derivatives, but is a general component of early "depressed" cortical activity (**14**).

A single dose of morphine in a normal individual has no appreciable effect on his cortical activity, but in addicted and in post-addicted groups the alpha per cent distribution curves differ from those of the normal groups, tending to show a high per cent-time alpha (**2**).

The practical value of the electroencephalograph in clarifying the

diagnosis of epileptiform seizures and in judging the efficiency of treatment has made it a routine test on such patients at a number of clinics, despite the fact that there does not seem to be a specific pattern pathognomic for any type of seizure (26, 74). However, a very high proportion of these cases show slower than normal waves, particularly under the influence of hyperventilation. The mechanism whereby the ketogenic diet may reduce seizures in some epileptics is still uncertain, but it seems to have a parallel effect on the EEG. In a small group of epileptic children the "epileptic" waves were eliminated in those who showed clinical improvement and no change occurred in those not affected (51). A study of twins adds further evidence to the theory that the electroencephalographic pattern is an inherited feature which may be modified by environmental factors such as injury and disease. In identical twins the patterns were similar, and in those cases where only one twin had epileptic attacks, it was found that both had abnormal records but that the epileptic twin also had a history of some possible brain injury (46).

Certain choline derivatives, particularly acetylcholine chloride, produce a marked increase in electrical activity when applied directly to the cortex, and the degree of activity seems directly related to the stability of the solution in the presence of cholinesterase which tends to hydrolyze acetylcholine rapidly. It is speculated that the mechanism and etiology of convulsive seizures in humans may be related to disorders in the metabolism of acetylcholine which is a normal brain constituent, but which acts as a convulsant in larger quantities (4).

Pyknolepsy has been considered distinct from epilepsy, but careful consideration of its nature from various viewpoints has led to the conclusion that it is a form of petit mal because of the similar clinical picture, the wave-and-spike form appearing in the EEG in both, the lack of evidence of definite psychogenic factors in pyknolepsy, and the high incidence of epilepsy in families of pyknoleptic patients (59).

In studying the pathogenesis of chorea it was found that the cortical potentials tended to be irregular, but were not specific for the disorder. It was concluded that the choreiform movements originate at the level of the cerebral cortex, congenitally or because of lesions in the pathways normally modulating the activity of the cortex (8).

A high percentage of eclamptic women show a cerebral dysrhythmia and many of these also had a family history of convulsive disorders, suggesting that this is another example of an inherited dysrhythmia exaggerated to the level of a clinical seizure, in this case by the associate toxemia (53). Similar evidence is suggested in cases of Paget's disease with convulsions which show abnormal EEG in themselves and in near relatives, whereas the patients without convulsions did not have abnormal records (57).

Further reports on the effects of specific intracranial pathology on the EEG do not show any definite pathognomic patterns, although there does seem to be a relationship between the extent of the lesion and the degree of electroencephalographic abnormality (**66, 10, 18, 9, 42**). When experimental lesions were produced in the cerebral cortex and basal ganglia of monkeys, at least a temporary flattening and slowing of the medium frequency waves appeared post-operatively, which was more prominent after larger lesions. Marked changes, particularly the appearance of hypsersynchrony, occurred after lesions of the head of the caudate nucleus and/or the putamen, but the greatest effect was produced by combined lesions of the motor cortex and basal ganglia. If these lesions were produced in infancy, more extreme changes occurred in the EEG (**42**). The immediate effects of concussion on the cortical potentials and on the lower reflexes of cats led to the conclusion that "concussion is the direct result of mechanical violence to cerebral cells" and is not dependent on secondary changes such as edema, anoxia, or hypoglycemia. The concussing blow reduced or stopped entirely the electrical activity of the whole cerebrum, followed by the delayed appearance of abnormal slow waves similar to those seen after concussion in man. With local trauma the electroencephalographic changes were limited to the injured area, but they were similar to those of generalized concussion (**75**). The post-concussion syndrome in man probably has an organic basis as indicated by the relatively frequent occurrence of abnormal EEGs in these cases (**54**).

Conflicting studies on the effect of increased intracranial pressure led to experimental work on cats, dogs and monkeys in which a rapid increase in pressure was produced, directly through trephined openings, to levels above those encountered in clinical practice. The effect on the electrical activity of the cortex seemed to depend on the relationship of blood pressure and intracranial pressure, there being no correlation between the absolute level of intracranial pressure and the electroencephalographic changes. This suggests that the effects of acute intracranial pressure are the result of impairment of blood flow, rather than an effect of the pressure per se (**29**).

The changes in cortical potentials of frogs' brains under the influence of curare (**23**) and of heat (**24**), suggest that a reversible brain narcosis may be produced by these means, and that the peripheral and central actions of these agents are independent of each other.

An extensive study of the electroencephalograms in cases of neurosyphilis shows 50 per cent of them abnormal, as compared with 7 per cent abnormal in the control group. Treated cases showed fewer abnormal records, the clinically most severe group were most apt to have abnormal records, and clinical and electroencephalographic improvement were parallel, but there were no specific patterns observed which

might be of diagnostic significance. The records of all types tended to be symmetrical, whether improving or deteriorating, suggesting a pacemaker action. Since pure tabes, dementia paralytica and optic atrophy showed a similar per cent of abnormal EEG, it is suggested that lesions in the upper brain stem and base of the cerebrum may be more influential than cortical lesions in producing abnormal potentials, possibly through influencing a pacemaker in this area. It should be noted that a normal EEG does not rule out the possibility of a cortical lesion (27, 28).

No absolute correlation has been found between the EEG and the clinical observations of a number of patients with common organic psychoses, although there is a significantly higher per cent of abnormal records in such a group that in the normal population. The presence of 1–5 per second waves may be of some diagnostic value in organic psychoses, but a normal record does not exclude an organic basis for the disorder (39). The neuropsychiatric sympsoms of some generalized diseases may be due to interference of oxygen or sugar supplies to the brain, or to inadequate carbohydrate metabolism in the brain tissue. Cases with cerebral anemia, anoxemia, and disturbed carbohydrate metabolism showed abnormal EEGs, chiefly slower frequencies, along with their clinical symptoms (20).

In comparing pneumoencephalograms and electroencephalograms from a group of non-focal neurological disorders, no direct correlation of abnormality by the two methods was found, although there was some indication that slow activity was common and rapid activity uncommon in cases with dilated ventricles, but it is quite evident that the electroencephalogram is an adjunct, not a substitute for the pneumoencephalogram (71).

Studies are underway to correlate flying ability with the electroencephalogram, but there is nothing conclusive on this yet (70). Attempts to link the IQ with the electroencephaographic pattern have also been inconclusive to date (43).

The cessation of alpha waves when a patient attempts to look at an object, though claiming not to see it, may be taken as an indication of hysterical or malingering blindness, and the persistence of the alpha rhythm would indicate an organic type. This also suggests that hysteria does not involve the sensory or motor pathways or their primary cortical centers (44).

The electroencephalogram has not yet been proven of specific value in the diagnosis of mental disorders, although a variety of studies have all seemed to indicate that the per cent of abnormal records in such groups is significantly higher than for control groups. The chief value of the EEG in the usual mental hospital seems to lie in picking out the probable epileptics and those with definite organic disorders (73).

Among the others the outstanding characteristic is their variability—between cases and within records. This has been particularly true in the studies of schizophrenics. Earlier studies had suggested that schizophrenic and epileptic patterns were related, but since the idea of a specific epileptic pattern has been largely discounted by finding the so-called "epileptic pattern" associated with other clinical conditions, various attempts have been made to discover a "schizoid-type" pattern. When ranking EEGs according to a five point stability scale, a significantly greater per cent are border-line or abnormal records among the schizophrenics than among normal control groups (based on 500 schizophrenics, 215 controls) (**25**). The catatonic-hebephrenics have the greatest per cent of abnormal records among the clinical divisions of schizophrenia (**25, 56, 73**). One attempt has been made to examine the relationship between the activity of the hypothalamus and cortex with varying conditions under which the schizophrenic may break down and show deviations from the normal, instead of confining the study to cortical activity with the subject at rest. The response of schizophrenics, as recorded in the EEG via basal and cortical leads, is markedly lacking in the excitation reaction produced in normals and neurotics by external cold, intramuscular adrenalin, electrical stimulation of the hypothalamic region, and verbal stimulation. It might be that "the deficiency in hypothalamic activity throws the stress of adaptation into the motor field" and that this accounts in part for the schizophrenic behavior. (**37**)

Manic-depressives showed normal records with no characteristic shift in the EEG accompanying the mood changes (**73**), unless the level of consciousness was impaired (**16**).

Electroencephalograms taken in conjunction with seizures induced by electricity, metrazol, and insulin, show abnormal patterns which somewhat resemble those of many epileptics, and which tend to disappear with time. The degree of variation and persistence of these changes seems directly related to the pre-shock record as well as to the number and severity of the seizures (**47, 60, 61**). When minor attacks were induced the transient appearance of random activity and slower and faster waves in the record were closely associated with the clinical loss of consciousness, resembling petit mal, but without the appearance of wave-and-spike patterns in the record. Even large series of these minor shocks did not produce alterations in the EEG persisting for more than twenty-four hours. When major, generalized convulsions were induced, the record showed marked changes which were more extensive and persisted longer when more shocks were given, but which tended to disappear within six months. In considering the advisability of shock therapy, it should be kept in mind that in some cases the cortical changes, as reflected in the EEG are still present after six months, that if the pre-shock pattern is abnormal a longer time is necessary before the pattern

resumes its pre-shock state, that the clinical signs after shock are of an organic type of sensorial and intellectual impairment, and that spontaneous seizures are known to have developed after such therapy. It should also be noted that clinical improvement is not directly related to the presence of changes in cerebral function as demonstrated by the electroencephalogram. Electric shock produces more severe changes in the record and in intellectual functioning that does metrazol, although the incidence of patients showing changes is similar with both types of shock. It may be that an abnormal pre-shock EEG contra-indicates shock therapy. The mechanism of the therapeutic effect of shock treatment is still very much in the realm of speculation, but the electroencephalograph offers an objective measure of one area in which demonstrable changes occur.

The influence of drugs on personality functions and on the cortical electrical activity in schizophrenics showed only slight correlations when mescaline and sodium amytal were given. Electroencephalographic changes were always associated with psychological changes, but psychological shifts occurred without affecting the electroencephalogram. There seemed to be a tendency for the effect to be characteristic of the patient, rather than of the drug (63).

In less extreme cases it is becoming more apparent that there is also some relationship between the cortical activity and the personality structure, but what this relationship may be is certainly not clear. In a group of grossly normal adolescent boys, variations from the "normal" frequency of approximately 10 per second tended to be associated with either "good" or "poor" personality, with unusually slow activity more often found among the "poor" personality group, and unusually fast waves among the "good." This is in keeping with previous studies on children, where slow activity tended to occur more frequently in those whose behavior was socially undesirable (30).

Other approaches have been made in which the percentage of alpha waves present is given more consideration than the frequency of the dominant rhythm. Previous studies had suggested a correlation of dominant alpha records with passive, receptive, dependent personality types, and among manic-depressives a slight tendency for dominant alpha to be associated with the depressed phase, and rare alpha with the manic phase (16). In a study of peptic ulcer patients the electroencephalographic evidence supported the impression gained from the personality studies that such patients differ from the normal population in their personality structure. A control group showed a normal distribution curve of the alpha index, but the peptic ulcer group showed peaks at both the low and high ends of the distribution curve for the per cent of alpha present, with three and one half times more dominant alpha records than in the normal group. The value of this study lies particularly

in indicating the way in which a number of approaches can be used in evaluating the factors in somatic disorders and in studying personality in general (62).

On the whole the recent studies on behavior disorders have tended substantiate earlier studies. The per cent of abnormal EEGs found in problem children ranges above 60 per cent in small groups (6, 7, 19), and in a large number (339) of adult prison inmates is twice as great as in a control group (34). There was a higher per cent of abnormal records, and greater response to hyperventilation, among behavior problem children than among normals, and when they were divided into four age groups between four and eighteen years of age the same relationship existed at all age levels, but the largest absolute amounts of abnormality were found consistently in the records from the youngest group, and progressively diminished with age. This is compatible with the concept of maturation as a factor in the occurrence of abnormal slow waves, and possibly with behavioral disorders. In this sense the EEG may possibly offer an objective measure of physical immaturity of the brain (65). The practical value of such findings may lie in determining therapy. Medication is sometimes helpful, such as benzedrine and dilantin (7, 50). However, there may be definite improvement in behavior without any significant changes in the electroencephalographic abnormalities (7).

Electroencephalography is still in the descriptive stage, and still in need of developing standardized techniques and classifications before adequate interpretations and explanations can be attained. Much more work on clinically normal groups must be done in order to establish a basis for the diagnosis of abnormality.

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POST-COLLEGE VOCATIONAL ACTIVITIES AND ATTITUDES OF PSYCHOLOGY MAJORS

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This is an attempt to consider the role the study of psychology plays in the vocational and personal life of University of Illinois alumni who have received a bachelor's degree in liberal arts with a major in psychology. The problem was begun and carried out as a co-operative research activity of the University of Illinois chapter of Psi Chi.* While the original purpose of the investigation was to obtain first hand information for the members of the local chapter of Psi Chi, the problems of students of psychology and their teachers in different institutions would seem to be sufficiently similar to warrant making the data available generally. That elementary courses in psychology have received considerable interest and attention is indicated by the popularity of symposia on the teaching of psychology at national and regional meetings, as well as by the comprehensive bibliography included in Wolfle's review on *The First Course in Psychology* (3). The present study is concerned with the reactions of former psychology majors to all the courses in psychology they took as undergraduates, the extent to which their present vocational activities are related to their major study, and their attitudes toward psychology. Such information should be of value both to students who contemplate majoring in psychology, as well as to those who teach them.

To show that the undergraduate courses offered by the department of psychology at the University of Illinois are fairly typical a comparison can be made with those offered by other colleges of liberal arts. The University of Illinois listings during the years 1932–1940 include every course offered at 35 per cent or more of the institutions included in Henry's (2) survey of undergraduate courses in psychology except for a course in Tests and Measurements and a course in Statistics, which are given locally by another department or college. Following is a list of the 22 undergraduate courses, totaling 56 hours, given at the University of Illinois during this period: Introduction to Psychology (4 cr.); General Psychology (Fields of Psychology)(4 cr.); Laboratory Practice (Elementary) (2 cr.); Mental and Physical Work (Industrial Psychology) (2 cr.); Social Psychology (3 cr.); Character and Personality (3 cr.); Physiological Psychology (not given 1932, '33, '37) (2 cr.); Minor Problems (Advanced Laboratory—not given 1932, '34) (3 cr.); Psychological Aesthetics (added 1937; not given 1938) (2 cr.); Thesis and Honors Course (2 cr.); Psychology of Motivation (2 cr.); Comparative Psychology (3 cr.); Feeling and Emotion (not given 1932–2, 1937, 1939) (2 cr.); Learning and Comprehension (2 cr.); Genetic

* While many members participated, particular recognition should be given to Joseph F. Zygmunt, president, Mrs. Eva S. Teppert, and Glen A. Brackbill. Sarah Martha Watson, research chairman, studied the data and summarized it. Hilding B. Carlson, faculty advisor, supervised the project.

Psychology (until 1937, 2 semester hours) (3 cr.); History of Psychology (given 1933, 1937) (2 cr.); Perception (not given 1937; until 1932, 3 semester hours) (2 cr.); Systematic Psychology (2 cr.); Abnormal Psychology (3 cr.); Recent Experimental Problems (Psychology of Thinking—given 1933, 1938; summer, 1938, 2½ semester hours) (2 cr.); Individual Differences (3 cr.); Student Personnel Work (added 1938) (3 cr.).

The minimum requirements that individuals must meet as undergraduate majors in psychology are 120 semester hours, with an average grade of C, including 20 semester hours in psychology beyond the *Introduction to Psychology*. The psychology courses represent, then, at least 20 per cent of the total hours necessary for the bachelor's degree.

A blank questionnaire form, called an inventory, and an accompanying letter were mailed in the autumn of 1941 to each individual who had graduated during the years 1932–1940 with a major in psychology and for whom an address could be obtained. Sixty-two, or 35 per cent, of the 176 individuals assumed to have received the inventory filled it out and returned it by mail.

Age and sex. The distribution of the individuals at the time of the investigation according to date of graduation, sex, and age is shown in Table I. The maximum time interval intervening between graduation and this investigation is 9 years, the minimum 1 year, and the mean slightly over 3 years.

TABLE I

DATE OF GRADUATION, SEX, AND PRESENT AGE OF THE INDIVIDUALS WHO RETURNED COMPLETED INVENTORIES

Date of graduation	Sex		Present Age range	Median age	N
	Male	Female			
1932–3	2	3	28–33	30	5
1934–5	2	2	25–28	26.5	4
1936	2	3	25–27	26	5
1937	5	1	25–29	26	6
1938	8	5	23–30	25	13
1939	2	8	23–33	23	10
1940	8	11	20–29	22	19
N	29	33	20–33	25	62

Marital status. Ten of the 29 men and 16 of the 33 women were married. Three of the men and 5 of the women had children.

Postgraduate training. Thirty-three, or 53 per cent, of the individuals had taken or were taking some additional training beyond the bachelor's degree. Fourteen of these had already received graduate degrees. Ten stated that they had received or were receiving additional training in psychology. Four gave medicine as their postgraduate study,

3 theology, 2 social administration, 2 commerce, and 1 each law, interior decorating, engineering, and nursing. Eight failed to specify any field of concentration. Thus, at least one-third of those who took graduate work did so in psychology.

Present occupation. Table II lists the occupations and salary ranges of these individuals. Thirty-nine, or 63 per cent, were engaged in activ-

TABLE II

OCCUPATION AND INCOME WHEN THE INVENTORY WAS RETURNED

Occupation	Sex		N receiving income	Income range (yearly)
	M	F		
Army service	1		1	$330*
Business	3	4	7**	800–3300
Housewife		10		
Instructor, college (psychology)	1		1	1400
Instructor, nurses (psychology)		1	1	1200
Librarian, hospital		1	1	1200
Minister	2		2	1200–1400***
Naval Air Service	1		1	2460
Personnel Classification, Maritime Commission	1		1	3500
Physician	2		2	1200–1800
Principal, High School	1		1	1800
Psychologist, clinical	1	1	2	1000–1314*
Public opinion survey	2		2	1800–2268
Railroad traffic agent	1		1	2580
Secretary		3	3	1000–1400
Social worker	3	3	6	1200–2100
Student	7	5	2	700–1200
Teacher, public school	2	3	5	810–1535
Unemployed	1	2		
N	29	33	39	330–3500

* With maintenance.

** Two individuals failed to report incomes.

*** With house.

ities involving some monetary recompense. Excluding the individuals in the Army, salaries ranged from $700 to $3500 per year, the median being $1312.50. On the basis of a nationwide study (1, p. 65) of the income of college graduates covering the years 1928 to 1935, the median salary of these former psychology majors is about equivalent to the median salary for women who have been out of college for about four years, and about $300.00 less per year than the median salary for men who have been out of college for a like period. The range of tenure in

the present position was from 1 to 84 months, the mean being 24 months.

The individuals obtained their present positions through a variety of means. Seven secured their present positions through members of their family or friends, 7 through employment agencies, 7 by means of personal interviews, 5 through promotions, 4 through applications, 3 each on the basis of competitive examinations and merit, 2 by contacts made in college, and 1 was drafted into the Army.

Two persons among the 39 who were gainfully employed did not reply to the question, "Do you like your present position?" Three replied "no." Two of these 3 stated they did not have sufficient desirable opportunities for advancement in terms of financial, social, and professional status, or opportunities for personal satisfaction. Of the 34 individuals who answered "yes," 19 were satisfied with their opportunities for financial advancement, 18 with the prospects for social advancement, 16 with the promise of professional advancement, and 27 said their position provided sufficient opportunities for personal satisfaction.

The questions concerning the value of college training in the individual's present position were answered by students and housewives, as well as by those holding positions with salary. The replies of the entire group will be considered.

Of the 62, 12 (6 housewives, 3 students, and the 3 unemployed) failed to answer the question, "In what way is your present position psychological in nature?" Five replied negatively with comments such as the following:

Stenographer: "In no way."

Business employee: "In no way except considering my contacts with customers."

Forty-five, or 73 per cent, described their present activities as psychological with replies such as these:

Minister: "Any minister seeking to minister to the needs of the present generation finds his job psychological in the main—sometimes almost one of dealing with pathological cases."

Secretary to a women's employment manager: "I do some interviewing of applicants and am constantly dealing with large numbers of people within and outside the company. I also do some testing, and a great deal of confidential personnel work."

Housewife: "I consider being a wife and mother as a position psychological in nature."

Five of these 45 were employed in strictly psychological positions. They include a college instructor in psychology, a nursing instructor in psychology, two clinical psychologists, and an assistant chief of personnel classification in the Maritime Commission. Four others were graduate students majoring in psychology. Thus only 8 per cent of the

total group were working in positions where their job classification is that of psychologist, with an additional 6 per cent presumably preparing to function as such. Psychological work is felt, however, to extend beyond the limits of professional psychology, as is indicated in the comments quoted.

Of the 17 individuals who implied that their activities were not psychological, eight gave no reply to the question, "Is the training you received in psychology at the University of Illinois of value to you in your present position?" Two replied that it was useless, 2 that it was helpful, and 5 that it was valuable. Of the 45 who considered their position psychological in nature, 11 stated that their psychological training was helpful, 24 valuable, an 10 indispensable. Thus, only 2, or 3 per cent of the total group, believed that their training in psychology was useless, while a total of 52, or 84 per cent, believed that their psychological training was helpful, valuable, or indispensable in their present vocational activities.

Twelve, or 19 per cent, of the individuals did not answer the question, "What other subjects which you studied at the University of Illinois are of value to you in your present position?" One person replied "none" to this question. Two of the remaining 49 listed "all of them" as being valuable. The remaining 47, or 76 per cent, named courses in 1 to 6 college departments, the average being slightly over 2 departments. The frequency of mentions, from the most to the least, were sociology, English, education, philosophy, mathematics, physiology, chemistry, and physics. All other college departments were mentioned less than five times. The frequencies are probably related to the frequency with which the courses were elected by these individuals while in college.

Previous occupations. Twenty-seven individuals reported that they had held a total of 43 positions following graduation and prior to their present activities. Thirteen of these held 1 position only, 12 held 2, and 2 held 3. The positions reported, from most to least frequent, were social work, office work, professional psychological work, business administration, teaching, selling, research, librarian, camp counseling, and clerking in a bank.

Twenty-two of the 43 previous jobs had been obtained through applications and interviews; 5, by means of personal contacts or acquaintance with the employer; 4, by offers from the employer. The remainder were obtained in a variety of ways. It is apparent from these facts, and from those reported in connection with the present positions of these individuals, that the psychology majors studied have relied largely upon their own initiative in obtaining jobs.

The salaries of these previous positions ranged from $1.00 per hour for occasional work to $3000 per year. The quartiles were $780, $1020, and $1200 per year. Only two incomes were above $1800 per year: $2600 and $3000, listed by the same individual as incomes from business. Five positions were listed without corresponding salary.

Of the 43 previous positions, 21 were reported as not being psychological in nature. Sixteen were not professional psychological positions but were considered to involve psychology to some extent. These included social work, teaching, camp counseling, research statistician, secretary, business, and selling. Six of the positions were recognized as being professional psychological work, and included testing, counseling, clinical work, research, and teaching.

The minimum tenure of these previous jobs was 1 month, the maximum 72 months, with the mean approximately 15 months. This average tenure is based on only 40 jobs, since the duration of 3 of them was not specified.

Numerous reasons were given for leaving the former positions. Eleven positions were of a temporary nature and the jobs discontinued; 8 were abandoned to obtain better positions elsewhere; 5 jobs resulted in promotions; 4 women resigned from their jobs to be married; 4 positions were given up because of dislike for the work; and in 3 cases the individuals returned to college for graduate study. One person was dismissed with no reason given. The remaining jobs were discontinued for sundry reasons.

In summary, 44 per cent of the individuals included in this survey had held paying positions previous to their present vocational activity. Forty-nine per cent of the former positions were non-psychological in nature, 37 per cent were somewhat psychological, and the remaining 14 per cent strictly psychological. The median salary was slightly over $1000 per year, and the jobs were, for the most part, either temporary jobs in themselves or a place for marking time until something better or different appeared. The jobs were obtained chiefly by applications and personal contacts outside the University.

Goals. In reply to the question concerning goals, "Before leaving the University of Illinois did you have a fairly clear conception of the work you wanted to do?" 45, or 73 per cent, answered "yes."

Thirty-one, or 69 per cent, of these 45 persons reported difficulties in finding their chosen occupation. Seven, or 16 per cent, reported no difficulty and 7 gave no reply.

Of the 31 who reported difficulties, 8 reported financial difficulties in achieving their goal, 7 said they had insufficient training for their chosen occupation, 6 that they could not find work, 3 that they were inexperienced in the work they wished to do, and 7 for sundry reasons.

In answer to the question, "How did these difficulties cause you to alter your goal?" 18 of those who had met with difficulties indicated that their goal had not been altered, 11 said that their goal had been altered by the difficulties encountered, and 2 made no reply.

Of the 11 psychology majors who had fairly clear aims when they left the University but who changed their goals, 7 women had made homemaking their goal, 2 individuals were undecided, 1 individual wished to be a C.P.A., and another intended to teach and do research in psychology.

Sixteen reported that they had no clear goal when they left the University. All but one now reported a goal. Two each wanted happy homes, good positions and good salaries, positions as high school principal, psychiatric social work, and

psychological work. Psychiatry, law, retail store manager, interior decorator, and advanced academic training were each indicated once.

Fifty-six, or 90 per cent, of the individuals now had fairly clear cut goals. Fifteen persons were classified as having socio-economic goals; 9 giving marriage and motherhood, and 6 such ambiguous statements as good position, financial stability, satisfaction from job, and the graces of living. Thirty-eight individuals specified professional or occupational goals, 18 of whom were already working at their chosen vocation and desired to advance therein. A need for further academic or professional training was indicated by 7 of these 18. The remaining 20 gave specific vocational goals, but were not engaged in the kind of work they named. Further academic training or occupational experience was named by 18 of these 20 persons as necessary to obtain work in their chosen occupation. Three individuals indicated only academic goals, 2 of them designated as doctor's degrees in psychology.

Fourteen, or 37 per cent, of those who specified professional goals named some form of strictly psychological work. If the two individuals who desired doctor's degrees in psychology are included, about one-fourth of the total group who responded to the inventory professed specific psychological positions as goals.

To the question, "On the basis of your experience, what do you think are the occupational opportunities for psychology majors at the University of Illinois?" 17, or 27 per cent, gave no reply or said "I don't know." The remaining 45, or 73 per cent, gave 106 suggestions, from 1 to 5 per individual, the mean being 2.4.

Of these 45 individuals, 23, or 51 per cent, stated that without an advanced degree the opportunities in psychology are limited, small, or nil. Others implied the need for graduate training by naming professional opportunities which require graduate degrees. Personnel work in industry and school was indicated by 13 persons; civil service and psychometrics were each mentioned by 8; institutional work by 7; teaching psychology by 6; research in psychology by 5; and child psychology by 1.

Eleven persons mentioned occupational opportunities in related fields. Five named public school teaching; others named psychiatry, social work, and medicine.

In general, the individuals indicated that their experience in various professional fields of psychology or related work had been hindered by the lack of further training beyond the bachelor's degree.

Reasons for choosing psychology as a major. Several questions related to reasons for majoring in psychology and to the subsequent expediency of that choice.

In the most comprehensive of these questions, the individuals were asked to reply to the following series of inquiries as to their reasons for choosing psychology as their major: "as training in professional work in psychology," "as supplementary training for other fields," "because of general interest," "as an aid in own personality problems," "because of a desire to understand others," and "other reasons."

All except 1 of the 62 individuals responded in some manner to at least one of these reasons. This one individual is not considered with the others because he made no evaluations and merely wrote that he

TABLE III

REASONS FOR CHOOSING PSYCHOLOGY AS A MAJOR AND JUDGMENTS OF THE ADEQUACY OF UNDERGRADUATE COURSES TO MEET THESE REASONS

	Number of judgments							
	Indispensable	Valuable	Helpful	Useless	Detrimental	N judges	Per cent of judges	Mean judgmental value
	+3	+2	+1	0	−1			
As training in professional psychology	18.5	14.5	4.5	1	.5	39	63	2.29
As supplementary training for other fields	9.5	21.5	7.0			38	61	2.06
Because of general interest	15.5	22.5	13.5	.5		52	84	2.02
As aid in own personality problems	7.5	18.0	16.0	1.5		43	69	1.73
Because of a desire to understand others	12.0	18.0	13.0	1		44	71	1.93
Other reasons		4.0	1.0			5	8	1.80
N judgments	63.0	98.5	55.0	4.0	.5	221		
N judges	36	45	35	4	1			
Per cent of all judges	58	73	56	6	2			

studied psychology because of "interest in the subject." Those who checked the indefinite "other reasons" also checked at least one specific reason. Three persons checked all 6. The mean number of reasons designated per person was 3.62. The replies are summarized in Table III.

Fifty-two, or 84 per cent, of the individuals checked "because of general interest" as one of their reasons for choosing psychology as their major. Forty-four, or 71 per cent, gave "because of a desire to understand others," 43, or 69 per cent, "as an aid in own personality problems," 39, or 63 per cent, "as training in professional work in psychology," 38, or 61 per cent, "as supplementary training for other fields," and 5, or 8 per cent, "other reasons."

Fourteen reasons in addition to those in Table III were named by 30 individuals for selecting psychology as their major subject. Nine chose psychology because they received better grades in psychology than in other subjects, 6 because of the mystery surrounding the word psychology, 4 because they enjoyed the subject, and 3 to round out their education. The remaining reasons were individual.

Extent to which psychology courses met the reasons given for choosing psychology. At the same time that the individuals indicated their reasons for choosing psychology, they were asked to indicate the extent to which they considered the courses in psychology satisfied these reasons.

Some were unable to evaluate the psychology courses they had taken in any one of the columns *indispensable*, *valuable*, *helpful*, *useless*, or *detrimental*. For example, a medical student qualified his judgment of the courses in psychology for training in professional work in psychology as "Indispensable if I go into psychiatry, otherwise valuable." A high school principal rated the courses in psychology between *helpful* and *useless* as a subject of "general interest" and as an "aid in own personality problems." In tabulating the data, each response of a double judgment was given equal weight by counting each such response as one-half, and each single judgment as one. On this basis, there were a total of 221 judgments, the gross number being 235. The maximum gross number of judgments by any individual to all 6 reasons listed in Table I was 8, the average being 3.9.

Forty-five, or 73 per cent, of the individuals rated the psychology courses as *valuable* in one or more respects. Thirty-six, or 58 per cent, regarded them as *indispensable*, 35, or 56 per cent, as *helpful*, and 4, or 6 per cent, as *useless*. Only one individual, an elementary school teacher, evaluated them as *detrimental*. However, at the same time, she checked *indispensable*, and accounted for her judgment of *detrimental* by commenting, "One board of directors thought psychology a lot of nonsense."

None of the five individuals who rated the courses in psychology as *useless* or *detrimental* did so in all respects. All 61 persons evaluated them as *helpful* or better in one or more respects.

In order to obtain a rough index of the extent to which the courses satisfied the various reasons for majoring in psychology, a comparison was made between the frequencies of judgments in each category. To

obtain such an index, the value 0 was given to the judgment *useless*, −1 to *detrimental*, +1 to *helpful*, +2 to *valuable*, and +3 to *indispensable*. The mean values thus obtained are included in Table III.

The individuals who majored in psychology for training for professional work in psychology ranked the courses in psychology highest with a mean of 2.29. Those who majored in the field for its supplementary training for other fields judged the courses next with a mean evaluation of 2.06. The individuals who stated they studied psychology because of general interest had a mean score of 2.02. This average score of *valuable* might be interpreted as indicating that, while psychology as a Liberal Arts and Science subject satisfied the cultural interest of these individuals, it was only one of the subjects which did so. Those who

TABLE IV

REPLIES TO THE QUESTION, "HAVE PSYCHOLOGY COURSES AT THE UNIVERSITY OF ILLINOIS HELPED YOU?"

	Yes	No	No reply
In your marital life?	24		38
In your parental life?	14	2	46
In your relations with friends and associates	45	8	9
N	83	10	93

majored in psychology because of a desire to understand others had a mean judgment of 1.93, while those who took psychology to help solve their own personality problems had the lowest mean score, 1.73. From these data, the inference might be made that the undergraduate psychology courses were considered of greater value for training in professional psychological work than in giving insight into the individual's own personality problems. While no attempt was made to determine the statistical reliability of the differences between the mean scores, the inference made from these differences is consonant with frequent remarks made by students in personal conversation with the authors.

However, there is other evidence to show that the courses in psychology at the University of Illinois were of some practical personal value. This is indicated by the replies of 53 individuals, as given in Table IV, to the question, "Have psychology courses at the University of Illinois helped you in (a) your marital life, (b) your parental life, and (c) your relations with friends and associates?" Forty-eight answered some part of the question positively, while 5 gave only negative answers. It is interesting to add that 88 per cent of those who were married indicated that the courses in psychology had helped them in their married

life. While many omitted answering parts of the question, others indicated their uncertainty by recording question marks.

The field of specialization if the graduates were to start college again. In reply to the question, "If you were to start your college career over again, in what field would you major?" 34 individuals, or 55 per cent, named psychology. Two of these qualified their answers by specifying aspects of the field that they would emphasize to a greater extent than they did, and a third wrote that she would get a bachelor's degree in psychology but would not do graduate work in the field. Seven others named psychology as their choice, but qualified it by naming some applied fields beyond the scope of formal psychology as such. Thus, a total of 41, or 66 per cent, of the individuals would again choose psychology or some applied field. Five others mentioned medicine as their choice, 4 commerce, 2 engineering, and 1 each bacteriology, economics, English and speech, mathematics and education, philosophy, secretarial work, sociology, and sociology and education and law. Two individuals commented that the major subject made no difference.

It is apparent that some individuals felt the need for technical or professional training in some field. This is shown by the fact that 19, or 68 per cent of the 28 who do not rename psychology without qualification, mentioned applied fields of psychology, medicine, commerce, engineering, and secretarial work.

The replies to the question, "What other courses which you did not take at the University would you take if you were to start your college career again?" were not tabulated so as to distinguish between those who would and those who would not major again in psychology. Four persons made no reply to this question, including the 2 who had indicated that the choice of a major made no difference. A total of 130 replies were made by the 58 persons who answered this question. The maximum number of subjects mentioned by any individual was 9, the average being 2.3. In some instances the replies represented subjects in the fields in which the individual would major; in some they were subjects supplementary to these fields; and in other cases they were probably listed for their cultural value. The subject most favored was mathematics (statistics usually specified) with 14 mentions; commerce and physiology were tied for second place with 9 mentions each; economics, music, and philosophy were each mentioned 8 times; art, education, sociology, and zoology were each mentioned by 6 individuals; English and political science by 5. The frequencies with which all other subjects were mentioned were less than five.

That the undergraduate work in psychology done at the University of Illinois was considered helpful in many ways to these individuals is indicated by their own testimony and particularly by the fact that about

two-thirds asserted that they would again major in psychology, although some with qualifications, if it were possible to begin their undergraduate careers again.

Suggestions regarding psychology curriculum. To the question, "What general or specific changes would you suggest in the psychology curriculum at the University of Illinois?" 1 person made the ambiguous reply, "a revolutionary one," and 13 made no reply or professed to be unable to make suggestions. The remaining 48 persons made a total of 88 suggestions, 1 to 4 each, the mean being 1.7.

It is difficult to catalogue all of these suggestions. One general trend is present, however, since the largest number of suggestions, totaling 36, were to the effect that the psychology curriculum be made more practical. Thirty persons would like to see the addition of more applied courses. Some of these 30 mentioned as many as 5 such courses. Along a somewhat similar vein, six persons recommended a more practical emphasis in the presentation of course materials. Eight felt that the material in some of the courses should be presented in a more stimulating and interesting manner. Six suggested that a greater attempt to made to integrate the courses within the department and with courses in other departments.

Fourteen recommendations were to the effect that student be required to take specific courses. Eight of these suggestions were that such courses as mathematics, physics, and chemistry be demanded in order to insure more adequate background for psychology, while 6 would require more experimental work within psychology itself.

The remaining 24 suggestions were more or less individual and no general comments can be made regarding them.

Interpretation of data. What significance do these responses have for teaching undergraduate psychology majors and for the undergraduate psychology curriculum? If we can assume that former undergraduate psychology majors are competent judges of what should be included in undergraduate courses in psychology, the task of an undergraduate department of psychology, even for its own majors, is primarily that of general education, and only secondarily that of specific preparation for occupational specialization in related fields and for professional training in psychology. It would seem that Wolfle's (3, p. 689) statement, "It is much more to the point to train elementary students to think for themselves about psychological problems than to teach them the logical and experimental steps in a method which most of them will never use," is almost as appropriate for all, or at least most, undergraduate courses in psychology as it is in connection with the first course itself. The frequent suggestion that undergraduate courses be made more practical and applied presumably refers to aiding students to gain greater insight

into their own and other's personality and problems, as well as to training for occupational specialization in related fields. If so, Wolfle's third objective for the elementary course (3, p. 689), "to make the elementary course useful to the individual student by developing his ability to understand and to cope with the personal adjustment problems of daily life," is also pertinent to all, or at least most, undergraduate courses.

Since opportunities for professional work in psychology with only a bachelor's degree are reported to be negligible, and only a small portion of those who get a bachelor's degree in psychology ultimately become professional psychologists, specific training for professional work in psychology might well be delayed until graduate study. Such a procedure might enable psychologists to do more effectively, to again quote Wolfle, "the much more important job of helping to prepare the student for the role of an educated member of society" (3, p. 690).

Summary. The University of Illinois chapter of Psi Chi studied the post-college vocational activities and attitudes of alumni who had graduated with a bachelor's degree during the years 1932–1940 with a major in psychology. Sixty-two, or 35 per cent of 176 individuals, replied to an inventory mailed to them in the autumn of 1941.

1. Thirty-nine, or 63 per cent, of those who replied were gainfully employed; 10, or 16 per cent, were housewives; another 10 were students not gainfully employed; 3, or 5 per cent, were unemployed.

2. The salaries of those employed at the time of the inventory ranged from $700 to $3500 per year, the median being $1312.50. The tenure ranged from 1 to 84 months, the mean being 24 months.

3. Eighty-four per cent of the total group believed that their psychological training was helpful, valuable, or indispensable in their post-college vocational activities, 73 per cent describing their work as being psychological in nature to some extent.

4. Although only 8 per cent of the group were employed in strictly psychological positions, with an additional 6 per cent taking post-graduate training as preparation for professional psychology, 25 per cent of the group professed strictly psychological positions as goals.

5. Occupational opportunities for the individual with only a bachelor's degree are reported as being very limited.

6. Eighty-four per cent chose to major in psychology "because of a general interest" in the field, 71 per cent "because of a desire to understand others," 69 per cent "as an aid in their own personality problems," 63 per cent for "training in professional work in psychology," and 61 per cent as "supplementary training in other fields." In respect to one or more of the above reasons, 73 per cent rated the courses in psychology as *valuable*, 58 per cent as *indispensable*, 56 per cent as *helpful*, and 6 per cent as *useless*.

7. About two-thirds of the former majors would again choose psychology or some applied aspect of psychology if they could start their college career over again.

8. Seventy-five per cent of those who made suggestions regarding the courses in the psychology curriculum would like to see the courses made more practical.

9. The suggestion is made that specific training for professional work in psychology might well be delayed until graduate study.

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WOMEN IN AMERICAN PSYCHOLOGY: PROLEGOMENON

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Something ought, we think, to be done about women in American psychology. We ought to know the facts about what they are doing, and we ought then to consider whether they have any special role in the American scene, what their special functions are and why, what aspiration would best represent the full utilization of America's women in psychology.

In this first paper we undertake merely to discover the numerical facts. How many women are there in the American Psychological Association? How many are there in the American Association for Applied Psychology? How active are they? Do they fill administrative posts in proportion to their numbers? In general they do not. Why not? Do they not wish to, or will not the more numerous men elect or appoint them? Why do women function somewhat more effectively, as it would seem, in the American Association for Applied Psychology than in the American Psychological Association? Do women 'naturally' make better applied psychologists than 'scientific' psychologists, or is it our culture that directs them into special fields of endeavor?*

Everyone knows what has happened. American psychology in the 1880's and 1890's got its foot in the doors of American colleges and universities. In 1892 the American Psychological Association was founded for "the advancement of psychology as a science." A great deal of its subsequent history can be explained by the meaning of that word *science*. A great deal more was due to the fact that psychologists were, for the first forty years of the Association's life, mostly college and university teachers of psychology. The men's colleges wanted men teachers. The women's colleges might take women teachers, but they wanted some men too. The coeducational colleges wanted mostly men teachers, although sometimes a few women as well. The higher education of women had lagged behind the higher education of men; and there were fewer women's colleges than men's colleges, fewer women students than men. Men disliked being taught by women more than women, accustomed to being led by men, disliked being taught my men. There just was not, at the beginning of American psychology—nor is there now—as much chance for a woman to get a job as a teacher of psychology as there was for a man.

* Gardner Murphy (2) seems to think that there are some psychological activities at which women succeed better than men, but he does not say why, merely giving examples of women who, in limited fields, happened to display leadership in 1943.

When clinical psychologists and school psychologists began to be important, women began to find more jobs open to them. Did they go into this work because few other positions were available, or because women are more 'personal,' more interested in children, than are men? That is a hard question to answer. We do not know whether we are discussing educational culture in America or the fact that men never have prolactin in their blood. Perhaps the answer does not matter. The fact is that the activities of women in American psychology have never, taken in the mass, been as noteworthy as the activities of men. Both men's and women's activities in professional associations have been increasing rapidly throughout the years, but the women are still far behind.

All this is not unrelated to the history of psychological associations in America, and to that blessed word *science*, for the advancement of which the American Psychological Association was founded. In 1937, a group of applied psychologists, frustrated by the dedication of the American Psychological Association to 'pure science,' clamoring for their place in the sun, broke away to found their own medium of self-expression, the American Association for Applied Psychology. In this clamor the voices of women were clearly discernible. There were enough female applied psychologists for them to be heard. The percentage of women in the new association was somewhat greater than in the old, and the women were more vocal, more active, more effective. Some of their frustration must have been relieved, but not all.

That the women psychologists still resented the barriers set up against them became evident when the Second World War created a national emergency. Many women believed that the men were favored in their chances to fight the Axis through service in the armed forces and in government agencies. The National Council of Women Psychologists was formed early in 1942 to give women greater opportunity to be of service on the home front. Many women wanted to be used more than they were and some are still seeking avenues for more effective war service. In part this frustration is economic: why should not women have jobs, enough jobs, good enough jobs? In part it is ideational: women feel that they can fulfill a useful function both in the emergency and in the reconstruction of the American social fabric after the war.

Whether or not these schisms in the American body psychologic will be healed by the reorganized American Psychological Association, in which each of the larger societies swallows the other, remains to be seen. It is, however, pertinent at the present time that we should have the facts about women in American psychology, because women, their needs and frustrations, have been in part responsible for these schisms.

The gross numerical facts about the numbers of women in these two

associations and their administrative activities therein, this paper sets forth. We leave until another time a consideration of the basic problem of what women might do and how they might be permitted or persuaded to do it.

Table I analyzes the membership of the American Psychological Association, in respect of both Members and Associates, by sex. The Association, as a matter of fact, does not know the sex of its members.

TABLE I

MEMBERSHIP IN THE AMERICAN PSYCHOLOGICAL ASSOCIATION ACCORDING TO SEX AND CLASS OF MEMBERSHIP

Year	Members			Associates			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
				Numbers					
1943	624	136	760	1835	880	2715	2459	1016	3475
1938	483	112	595	1157	566	1723	1640	678	2318
1933	420	110	530	751	388	1139	1171	498	1669
1928	421	112	533	38	128	166	459	240	699
1923	376	81	457	—	—	—	376	81	457
				Per Cent					
1943	82	18	100	68	32	100	71	29	100
1938	81	19	100	67	33	100	71	29	100
1933	79	21	100	66	34	100	70	30	100
1928	79	21	100	23	77	100	66	34	100
1923	82	18	100	—	—	—	82	18	100

It has taken us some research to find out in certain cases, and we may indeed have made some errors. There are, however, not many errors. We have succeeded in checking the figures of the Yearbooks in their grand totals, but not exactly in the numbers of Members and Associates, although there, too, the discrepancies are too small to matter. We have plotted the growth of the Association in respect of classes of membership and sex for the last two decades by quinquennia. The trends are stable and further analysis has seemed to us unnecessary. The growth curves, plotted from Table I, are shown in Figs. 1–6.*

The table and the figures show that the relative numbers of Members in the Association has remained about constant, near 20 per cent. When the grade of Associate was established in 1926, more women became Associates than men, but presently (by 1933) the percentage of women

* For other growth curves of the American Psychological Association—the growth of its membership and of its interests in different kinds of psychology—see S. W. Fernberger (1).

When clinical psychologists and school psychologists began to be important, women began to find more jobs open to them. Did they go into this work because few other positions were available, or because women are more 'personal,' more interested in children, than are men? That is a hard question to answer. We do not know whether we are discussing educational culture in America or the fact that men never have prolactin in their blood. Perhaps the answer does not matter. The fact is that the activities of women in American psychology have never, taken in the mass, been as noteworthy as the activities of men. Both men's and women's activities in professional associations have been increasing rapidly throughout the years, but the women are still far behind.

All this is not unrelated to the history of psychological associations in America, and to that blessed word *science*, for the advancement of which the American Psychological Association was founded. In 1937, a group of applied psychologists, frustrated by the dedication of the American Psychological Association to 'pure science,' clamoring for their place in the sun, broke away to found their own medium of self-expression, the American Association for Applied Psychology. In this clamor the voices of women were clearly discernible. There were enough female applied psychologists for them to be heard. The percentage of women in the new association was somewhat greater than in the old, and the women were more vocal, more active, more effective. Some of their frustration must have been relieved, but not all.

That the women psychologists still resented the barriers set up against them became evident when the Second World War created a national emergency. Many women believed that the men were favored in their chances to fight the Axis through service in the armed forces and in government agencies. The National Council of Women Psychologists was formed early in 1942 to give women greater opportunity to be of service on the home front. Many women wanted to be used more than they were and some are still seeking avenues for more effective war service. In part this frustration is economic: why should not women have jobs, enough jobs, good enough jobs? In part it is ideational: women feel that they can fulfill a useful function both in the emergency and in the reconstruction of the American social fabric after the war.

Whether or not these schisms in the American body psychologic will be healed by the reorganized American Psychological Association, in which each of the larger societies swallows the other, remains to be seen. It is, however, pertinent at the present time that we should have the facts about women in American psychology, because women, their needs and frustrations, have been in part responsible for these schisms.

The gross numerical facts about the numbers of women in these two

associations and their administrative activities therein, this paper sets forth. We leave until another time a consideration of the basic problem of what women might do and how they might be permitted or persuaded to do it.

Table I analyzes the membership of the American Psychological Association, in respect of both Members and Associates, by sex. The Association, as a matter of fact, does not know the sex of its members.

TABLE I

MEMBERSHIP IN THE AMERICAN PSYCHOLOGICAL ASSOCIATION ACCORDING TO SEX AND CLASS OF MEMBERSHIP

Year	Members			Associates			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
				Numbers					
1943	624	136	760	1835	880	2715	2459	1016	3475
1938	483	112	595	1157	566	1723	1640	678	2318
1933	420	110	530	751	388	1139	1171	498	1669
1928	421	112	533	38	128	166	459	240	699
1923	376	81	457	—	—	—	376	81	457
				Per Cent					
1943	82	18	100	68	32	100	71	29	100
1938	81	19	100	67	33	100	71	29	100
1933	79	21	100	66	34	100	70	30	100
1928	79	21	100	23	77	100	66	34	100
1923	82	18	100	—	—	—	82	18	100

It has taken us some research to find out in certain cases, and we may indeed have made some errors. There are, however, not many errors. We have succeeded in checking the figures of the Yearbooks in their grand totals, but not exactly in the numbers of Members and Associates, although there, too, the discrepancies are too small to matter. We have plotted the growth of the Association in respect of classes of membership and sex for the last two decades by quinquennia. The trends are stable and further analysis has seemed to us unnecessary. The growth curves, plotted from Table I, are shown in Figs. 1–6.*

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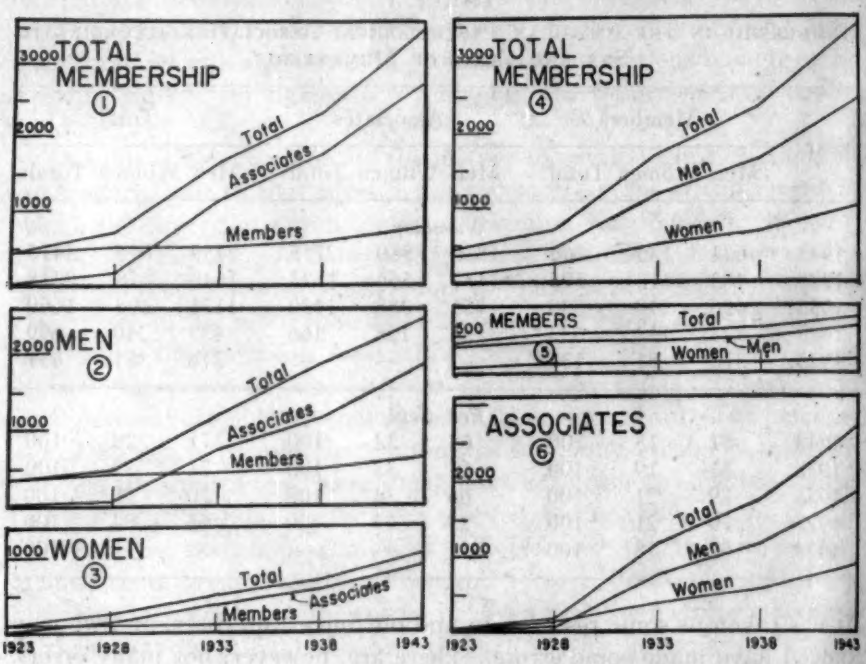
* For other growth curves of the American Psychological Association—the growth of its membership and of its interests in different kinds of psychology—see S. W. Fernberger (1).

settled down at a little more than 30. The female percentage of the total membership has since 1930 been about 30.

The American Association for Applied Psychology has a shorter history. The corresponding data for this organization are given in Table II—three samplings for the quinquennium 1938–1943. About 30 per cent of its Fellows are women, a figure which may be compared with the 20 per cent of the Members of the American Psychological Association.



FIGS. 1–6. GROWTH OF MEMEBERSHIP IN THE AMERICAN PSYCHOLOGICAL ASSOCIATION ACCORDING TO SEX

Women are somewhat more numerous among the more accomplished applied psychologists than among the more accomplished 'scientific' psychologists. Among the Associates of the two associations the difference is about the same. One-third of the Associates of the American Psychological Association are women, as compared with two-fifths of the Associates of the American Association for Applied Psychology.

Thus, in 1943, there were 1016 women (29 per cent) of a total membership of 3475 in the older association, and 218 women (33 per cent) of a total membership of 661 in the younger association. The more active role of women in the newer association is, therefore, not due entirely to their numbers, although it should be noted that the percentage

TABLE II

MEMBERSHIP IN THE AMERICAN ASSOCIATION FOR APPLIED PSYCHOLOGY ACCORDING TO SEX AND CLASS OF MEMBERSHIP

Year	Fellows			Associates			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
				Numbers					
1943	298	132	430	144	87	231	442	219	661
1941	270	125	395	130	84	214	400	209	609
1938	188	100	288	65	58	123	253	158	411
				Per Cent					
1943	69	31	100	62	38	100	67	33	100
1941	68	32	100	61	39	100	66	34	100
1938	65	35	100	53	47	100	62	38	100

of women at the founding of the American Association for Applied Psychology was 38. It dropped off a little in later years.

The most obvious way of assessing the activity of women in these two associations is to count the number of administrative appointments

TABLE III

ADMINISTRATIVE APPOINTMENTS IN THE AMERICAN PSYCHOLOGICAL ASSOCIATION ACCORDING TO SEX

Year	Officers			Editorial Appointment			Committee Members			Representatives			Totals			
	Tot.	Men	Women	Tot.	Men	Women	Tot.	Men	Women	Tot.	Men	Women	Tot.	Men	Women	% Women
1943	9	8	1	9	9	0	86	75	11	30	28	2	134	120	14	10
1942	9	8	1	8	8	0	85	76	9	28	25	3	130	117	13	10
1941	9	9	0	8	8	0	80	71	9	28	25	3	125	112	13	10
1940	9	8	1	8	8	0	67	66	1	29	26	3	113	108	5	4
1939	11	1	0	8	8	0	55	54	1	30	28	2	104	101	3	3
1938	9	9	0	8	8	0	33	33	0	30	29	1	80	79	1	1
1933	9	9	0	8	8	0	16	16	0	16	16	0	49	49	0	0
1928	9	9	0	—	—	—	13	13	0	13	13	0	35	35	0	0
1923	9	8	1	—	—	—	35	30	5	10	10	0	54	48	6	11

they have held as officers, editors, committee members and representatives of the association in other organizations. These data are given for the American Psychological Association in Table III, for the American Association for Applied Psychology in Table IV. Since there seems to

have been a sudden increase in the number of such appointments in the older association about 1941, the data in Table III are given by successive years in the quinquennium 1938–1943.

It is at once apparent that women have been more active in the younger association than in the older. In the American Psychological association there have been few women officers, no women editors, and only recently any appreciable number of women committee members. The percentages run in the years studied from zero to 4 (an exception in 1923) until 1940. In the last three years, 10 per cent of the appointments have been of women. The corresponding percentages for the American Association of Applied Psychology are 18, 19 and 25 in the three years sampled.

TABLE IV

ADMINISTRATIVE APPOINTMENTS IN AMERICAN ASSOCIATION FOR APPLIED PSYCHOLOGY ACCORDING TO SEX

Appointments	1938			1941			1943		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Officers—General	13	11	2	15	12	3	15	9	6
Officers—Sections									
Clinical	10	9	1	10	7	3	11	7	4
Consulting	9	7	2	9	5	4	9	3	6
Educational	6	5	1	10	10	0	7	7	0
Industrial	6	5	1	10	8	2	10	9	1
Editorial Appointments	19	16	3	20	15	5	22	12	10
Committee Members	113	92	21	78	66	12	107	90	17
Representatives	—	—	—	3	3	0	6	4	2
Totals	176	145	31	155	126	29	187	141	46
Percentages	100%	82%	18%	100%	81%	19%	100%	75%	25%

Do women get their share of the jobs? Are their services utilized in proportion to their numerical availability? In the American Psychological Association, No. In 1943, only 10 per cent of the official appointees were women, whereas 18 per cent of the Members were women and 29 per cent of Members and Associates considered together were women. In the American Association for Applied Psychology the answer to the question is still No, but the women are much more generously represented, or more onerously used, whichever phrase is right. In 1943, 25 per cent of its appointees were women, 31 per cent of its Fellows were women, 33 per cent of its total membership were women.

In the American Psychological Association, there have been 29 presidents, of whom two were women (Calkins, Washburn). In the American Association for Applied Psychology, there have been seven presidents, all men. Among the 21 chairmen of sections elected by this latter association, only one has been a woman. The people who do the

hard work—the secretaries of the section—are apt to be women: 8 of 13.

One of the reasons why women play a less important role in the American Psychological Association than in the American Association for Applied Psychology is that the older association is devoted to 'scientific' psychology, and fewer women become distinguished 'scientists' than do men. The word *science* in these contexts has its meaning set by the older sciences—physics and chemistry primarily, the biological sciences secondarily. As to whether the exclusion of women from wide participation in the established sciences is due to nature or nurture, we venture no opinion, but certain it is that modern civilization tends not to place them in 'science,' not in any large numbers. Here are some of the facts.

In the fifth edition of *American Men of Science* (1933), of 9785 names listed, only 745 (7.4 per cent) were the names of women. These names can be allocated to twelve sciences, and the percentages of women run from 2.1 per cent for physics up to 10.4 per cent for physiology—except for psychology, a 'science' in which there were listed 117 women (22.0 per cent) of a total of 539. Probably psychology has introduced more professional persons into 'science' than most of the other 'sciences,' and in its case the professional jobs were the kind that women get and take—the jobs that have to do with the welfare of other persons.

What about high distinction? In each edition, *American Men of Science* stars the names of the supposedly most distinguished persons in each science. In its seven editions (1903 to 1943), the names of 127 psychologists have been so starred. Only eight of these names (Calkins, Ladd-Franklin, Washburn, Howes, Martin, Wooley, Downey and Goodenough) are women. That is 6.3 per cent. Of course, this is a closed society. Stars elect stars. That may be a factor in the result, but the result nevertheless tends to establish the pattern. Women ordinarily are not thought of as good scientists—not, at any rate, by most men scientists.

The highest scientific election that a person can receive in America is considered by some to be election to the National Academy of Sciences. It has had, since its foundation in 1863, 769 members. Among these, there have been only two women: Florence R. Sabin in pathology in 1925, and Margaret F. Washburn (a psychologist!) in 1931. That paucity of women must mean something more in our culture than the fact that men tend to vote for men.

In this connection it might be said that many of the committees of the American Psychological Association seem to have functions that would ordinarily be thought of as male. A Committee on Publicity and Public Relations might have women on it, might have a woman chairman, but is not the articulate public mostly male and could not a man

thus make the best contact with it? Would a Committee on Public Investments be likely to be female with the social structure what it is? Of course, a Committee on War Services to Children might be, and is, female. Women know about children, or are supposed to. All in all, it is our impression that the Association has more committees concerned with activities that are traditionally considered male than it has for the traditionally female interests.

There remains, nevertheless, the fact that even the American Association for Applied Psychology has fewer women in positions of responsibility than the feminine proportion of the membership would seem to make probable. Why? It is not devoted primarily to 'science,' supposedly a male field. The discrepancy must lie in the culture. Men vote for men and women vote for men, not always, but often enough to upset the proportions. Men are in the majority and determine the outcome of many votes. They hold the controlling interest. Women look to men for leadership more readily than men look to women. That asymmetry is deeply imbedded in our culture. And all these influences are cumulative. If women do not get elected to responsible posts as often as men, then there are fewer women of influence around the council table to help correct the discrepancy, and there is also less incentive for career-minded women to enter the field and to attempt in it to satisfy their ambitions.

If some superhuman decree, issued by an experimentalist-dictator, could arbitrarily reverse the number of men and women in important scientific positions without altering human nature, would that new imbalance, once established, tend to perpetuate itself? Or would some natural law of sex-difference presently assert itself and bring the proportions back to what they are now? We hope to have something to say about this matter in a later paper.

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A NOTE ON PSYCHOLOGICAL JOURNALS FOR FOREIGN LIBRARIES

WILLARD L. VALENTINE
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The American Library Association, through its Committee on Aid to Libraries in War Areas, in the current year is purchasing 150 volumes of American Psychological Association journals to be set aside for foreign libraries forced to relinquish subscriptions because of the war. The purchases are part of a program started in 1940 which now involves large numbers of subscriptions to 312 different scholarly, scientific and technical periodicals, of which APA journals number six and all psychological publications 20. Medical journals constitute about 25 per cent of all purchased.

Purchases by the ALA have to a considerable extent offset wholesale cancellations which left the Association with only a handful of foreign subscriptions in 1941. Following are Association journals on the ALA foreign reserve list to be stored until after the war:

	1944	*1943*	*1942*	*1941*	*1940*
Abstracts	25	25	25	20	20
Bulletin	15	15	15	5	—
Review	50	50	50	35	20
Experimental	20	20	20	5	—
Abnormal and Social	20	20	20	5	—
Applied	20	20	*	*	*

* Small reserves of this Journal for these years are held by Dr. Porter for later delivery.

Despite the volume of journals being sought, the ALA estimates it is meeting only half the foreign need and urgently solicits gifts from both individuals and publishers of current and back volumes—current volumes to supplement the committee's program, and back volumes to restore periodicals destroyed during the war, which the committee, under terms of the grant, is not able to replace. A number of gifts have been received and some allied governments and nationals are beginning to finance purchases for their own libraries, which the committee considers good signs. During 1943, for example, two groups of orders were placed for Chinese libraries, one being paid for by a Chinese government service and the other by the China Foundation.

The APA, apart from the ALA, in 1943 received an order from the Chinese Minister of Education, through the Universal Trading Corporation, for 20 sets of all seven of the journals for the years 1940–1946, inclusive. The Corporation assumes all storage and shipping responsibilities. In addition, a few journals go to the Associated Boards of Christian Colleges in China to be stored until after the war.

The Committee on Aid to Libraries in the War Areas has operated on an annual budget of about $70,000 since 1941, with funds supplied by the Rockefeller Foundation. Periodicals purchased totaled $43,000 in 1941; $52,845 in 1942; and $65,029 in 1943. However, in no case have funds allowed purchase of more than 50 per cent of the number of foreign cancellations reported by publishers. In view of the Committee's limited finances, publishers have allowed discounts on their publications averaging 17.4 per cent in 1943 and 15 per cent in 1942. In both years, the APA's discount was above the average, ranging from 25 per cent for the *Journal of Applied* to almost 50 per cent for the *Review*.

The Committee, originally called the Committee on Devastated Libraries, was organized toward the end of 1940, with the broad purpose of offering aid to libraries in war-torn countries. Its name was changed to indicate aid would not be limited to libraries suffering physical devastation. Inquiries about contributions to the very worth-while work of the committee should be directed to DOROTHY J. COMINS, Committee on Aid to Libraries in War Areas, Library of Congress Annex, Study 251, Washington 25, D. C.

PSYCHOLOGY AND THE WAR

Edited by

DONALD G. MARQUIS

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HISTORY, ORGANIZATION, AND RESEARCH ACTIVITIES PSYCHOLOGICAL TEST FILM UNIT ARMY AIR FORCES

STAFF, PSYCHOLOGICAL TEST FILM UNIT
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This article is the sixth in a series describing the Aviation Psychology Program of the Army Air Forces. Previous articles have dealt with a general description of the program and with the activities of Psychological Research Units No. 1, 2, 3, and the Department of Psychology, School of Aviation Medicine, and with the development and use of the Aviation Cadet Qualifying Examination (1, 2, 3, 4, 5).

The following sections describe the history, organization, personnel, functions, and research activities of the Psychological Test Film Unit.

I. HISTORY, FUNCTIONS AND PERSONNEL

The Perceptual Research Unit was originally set up in early July, 1942, as one of the three units of the Psychological Section, Office of the Surgeon, at the Headquarters of the Flying Training Command in Fort Worth, Texas. Its primary purpose was the constructing of aptitude tests for aircrew in the general field of perception, together with the carrying out of research in this field.

* This article was prepared by the Staff of the Psychological Test Film Unit and edited in the Psychological Branch, Research Division, Office of the Air Surgeon, Headquarters Army Air Forces, Washington, D. C.

For a period of over a year, the personnel of the group consisted of Captain (now Major) J. J. Gibson, Chief of Unit, Lt. (now captain) R. H. Henneman, Lt. (now Major) S. R. Wallace, and Lt. (now Captain) G. F. J. Lehner. All of these officers were psychologists with experience in experimental research, although none had been professionally engaged in test-construction. The administration of experimental tests to Aviation Cadets was accomplished by utilizing the testing facilities of the three Psychological Research Units in the Classification Centers. In general, the work of test construction was concentrated on two kinds of tests, printed group-tests and motion picture group-tests.

In order to continue the work on motion picture tests and the research on new testing techniques and other allied problems involved in the psychological use of films, the Psychological Test Film Unit was activated in October 1943 at Santa Ana Army Air Base, Santa Ana, California, and assumed the functions of the Perceptual Research Unit. The work of test administration was coordinated with that of Psychological Research Unit No. 3, and for the technical aspects of film production the cooperation of the AAF First Motion Picture Unit, a producing studio, was obtained. Continuation of the research on the paper and pencil type of perceptual group tests was turned over to the staff of Psychological Research Unit No. 3. The functions of the new unit were designated as:

a. the construction of motion picture tests for classification purposes;
b. research on motion picture and photographic methods of psychological testing and on problems of administering and scoring motion picture tests;
c. research on training problems connected with or amenable to motion picture and photographic techniques; and
d. advising, editing, and cooperating in the production of films for tests developed in any of the units of the Aviation Psychology Program.

The officer personnel consisted of Major J. J. Gibson, director, Captain G. F. J. Lehner, 1st Lt. R. M. Gagne, and 1st Lt. R. M. Eisenberg. The enlisted personnel, as of 1 April, 1944, were T/Sgt. R. W. Bornemeier, S/Sgt. E. C. Wiegand, S/Sgt. H. B. Price, S/Sgt. B. C. Finney, Sgt. N. N. Glaser, Cpl. C. H. Orvis, Pfc. E. M. Bannerman.

II. Hypotheses Adopted for Perceptual Test Development

A number of guiding hypotheses have been adopted, either explicitly or implicitly, for the work of aptitude test construction. In the most general terms it was believed that flying involved the use of visual cues to a large extent and that, consequently, tests of perceptual skills were very important for measuring aptitude for aircrew duties. This assumption applied particularly to pilots and accordingly the plans for test development at the beginning gave first place to pilot tests. At the start

of the perceptual research program, the data for planning and guiding test development were secured from the following sources:

1. The examination and interpretation of results of perceptual tests already validated against the criterion of graduation or elimination from pilot training.

2. The evidence from job analyses of the duties of aircrew members. This evidence was supplemented by the application of principles from the experimental psychology of visual perception whenever possible and by information from other activities.

3. The study of 1,000 eliminated pilots (6) made by the Psychological Division, Office of the Air Surgeon in Washington. The traits or abilities listed in this study under the heading of "Alertness and Observation" were of considerable value. Such traits as "Visualization of Flight Course," "Estimation of Speed and Distance," and "Orientation" were capable of interpretation in terms of actual psychological judgments or discriminations. Other traits appeared to be psychologically more complex.

4. The use of the inconclusive evidence available on pilot aptitude testing from the first World War and the subsequent interval of peace.

The more specific hypotheses employed for selecting certain tests to be developed rather than others were as follows:

1. The validities being obtained in the summer of 1942 on certain perceptual tests requiring judgments of distance and length suggested that similar tests also involving estimation of distance in two dimensions would be promising. As a result of this hypothesis, the Map Distance Test and the Path Length Test were constructed, using a map background for the purpose of giving the tests a plausible aircrew content. The Judgment of Proportions Test was constructed on a similar hypothesis, namely, that accuracy of visual imagery of familiar sizes and distances might correlate with flying aptitude. The validity of the Speed of Identification Test and of Part I of the Spatial Orientation Test also suggested that a test for speed of visual pattern-perception would be valuable, particularly if the perceptual speed factor were given a special emphasis by using individual brief exposures of the items. The Plane Formation Test was therefore devised, employing motion picture film for the controlled presentation of the visual patterns.

2. It was assumed at the beginning that tests requiring discriminations of time and events-in-sequence were necessary to supplement the motionless type of visual discriminations required by paper and pencil tests already in use. Plans were made, therefore, for the development of film tests which make possible a wide range of judgments involving motion, and hence are closer to the realities of aircrew performance. In particular, the Speed Estimation Tests were planned involving three different types of movement-perception.

3. It was assumed that, since tridimensional vision was obviously of importance for flying, tests requiring space perception and "constancy" of perception would be of value for the program. As a result, a memorandum on "The Application of the Concept of Perceptual Constancy to Aviation" was written and a research program was initiated on tridimensional vision. A number of tests arising out of this program have been planned and constructed, including a motion picture test of ability to make certain spatial discriminations believed important for landing.

4. It was believed that some aspects of "alertness" or "attention" ought to be tested, although this general hypothesis was difficult to translate into a specific test at the beginning. The standard laboratory experiments under the conventional heading of attention were appraised, but they appeared wholly inadequate to provide a test of the sort required. A motion picture test consisting of the presentation on the screen of moving dials on a schematic instrument-panel was early agreed upon, but the outline for this test underwent several stages of development before experimental forms were constructed. The chief difficulty encountered was in inventing some method of employing the fixed-category answer sheet (necessary for group testing purposes) for recording reactions to the dials. The Flexibility of Attention Test and the Integration of Attention Test were the result of these efforts.

5. The hypothesis was adopted that the ability to visualize images and spatial relationships was an important factor in aircrew success. For this reason, tests constructed by Professor L. L. Thurstone, including those weighted with what he called the "Space Factor," were looked upon as promising. Adaptations of these tests were constructed and additional tests such as the Picture Integration Test were devised on the basis of this hypothesis for inclusion in a battery of perceptual tests to be factor analyzed.

6. It was assumed that the complex ability to maintain visual orientation in space was important for aviation aptitude. A paper and pencil test of one aspect of directional orientation to the points of the compass was constructed, and a motion picture test of the ability to maintain orientation in a moving visual environment presented on the screen is under construction.

7. The hypothesis, taken from the study of 1,000 eliminees (6), of a complex trait called "Visualization of Flight Course" was agreed upon as one important to be tested. The trait was assumed to involve at least the third, fifth, and sixth functions listed above, plus the ability to integrate temporal impressions. The latter trait was suggested as important by Dr. V. Lowenfeld, and his test proposal was borrowed, with some modifications, for development. Two motion picture tests of the ability to combine successive impressions into a single perception have resulted.

III. Techniques Employed in Test Construction

The techniques which have been employed in developing perceptual aptitude tests can be classified in three ways: first, by test media; second, by types of judgment; third, by statistical procedures. They will be taken up in that order.

A. *Test Media*

1. *Paper and Pencil Group Test Method.* The standard procedures for constructing paper and pencil tests were utilized. The desirability of constructing all tests in such a way as to be scorable by machine resulted in experimentation on the effects of the procedure.

2. *Motion Picture Group Test Method.* The use of motion pictures for the presentation of group tests carried with it certain difficulties as compared with ordinary group tests, such as the necessity for equalizing

the visibility of the test items among the different testees, and the obtaining of a proper level of illumination of the testing room for writing responses; but it also had definite advantages over ordinary methods of testing, such as perfect standardization of directions by the sound track and, above all, the provision of a wider range of functions capable of being tested. Motion picture tests have now been administered on many occasions to larger samples under varying circumstances, and administrative problems have proved to be soluble. The method is believed to be not only practicable, but also to open up a new field for psychological testing.

3. *Individual Test Methods.* The most familiar procedure for either perceptual experiments or tests is the use of individual apparatus setups, such as the exposure device or, when the motor reactions are emphasized, the reaction or pursuit apparatus. It was considered at the outset that this method might also be employed for perceptual test research, but as the program developed emphasis was placed on methods (1) and (2) and consequently on the development of group tests for measuring perceptual functions. The virtue of this necessity was that group tests are highly economical of testing hours required for administration.

B. *Methods of Using Fixed-Category Answer Sheets*

Although the restriction to the use of printed answer sheets capable of being machine scored and providing only fixed answer categories appeared at first to limit seriously the possibilities for recording different types of perceptual judgments and discriminations, it was found that the restrictions could frequently be overcome. Several examples of the techniques employed may be given:

1. *Adaptation of the Method of Direct Reproduction to Answer Sheets.* Believing that the ability to imagine and reproduce visual patterns is not the same as the ability to recognize them, it was thought desirable to require the former type of response in a perceptual speed test, the Plane Formation Test. Each test item consisted of a visual pattern of five planes in a 25 space matrix with brief exposure intervals. This demanded a special use of the answer sheets. The demand was met by printing lines on the answer sheets to form blocks containing 25 answer spaces each. It was then demonstrated that the scores obtained from the scoring machine when each response was counted either right or wrong correlated well with the results from scoring the patterns as a whole. In a somewhat similar way, in the case of the Picture Integration Test, the response of making a spatial rearrangement of the disarranged segments of a picture was, after sone exploration, set up for scoring on an answer sheet.

2. *Adaptations of Various Perceptual Judgments to Fixed-Category Answer Sheets.* Most of the types of perceptual judgments which it was desired to use could not be fitted into either the conventional 5-choice or true-false categories. It was also thought to be undesirable to use answer sheets with more than five categories in any time limit test, since this alternative would emphasize the factor of clerical rather than perceptual speed. A number of methods were adopted for reducing various perceptual responses to simple categories. For example, the Directional Orientation Test, which involved at the beginning eight reactions corresponding to the eight points of the compass, was later simplified so as to involve only "matching" reactions between two compass diagrams. The Pattern Analysis Test and later the Flexibility of Attention Test were set up in such a way as to be recorded by a simple identifying reaction which consisted of either marking or not marking a single pair of the dotted lines on the answer sheet. In another test, Speed Estimation Test III, a judgment of relative visual velocities was required in terms of the prediction of the one of five positions in space at which an event will occur. This scale corresponded to the five categories on the answer sheet.

3. *Use of an Intermediate Work Sheet.* In the case of several tests where the response was not fitted for immediate recording on answer sheets, or where the variance produced by differences in clerical accuracy and speed had to be minimized, the use of an intermediate work sheet was employed for the primary responses to the test. These records were then transcribed on answer sheets by the testees. This method has proved to be practical for the Picture Integration Test, the Flexibility of Attention Test, and for research on the motion picture achievement test in Aircraft Recognition. The additional time required for administration is negligible as compared with the advantages gained.

C. *Employment of Item Analysis*

It was assumed that perceptual and motion picture tests should be constructed experimentally in a form containing many more items or judgments than were expected to be used in the final version of the test. An item analysis was then carried out, and the items were selected for consistency, proper level of difficulty, and in some cases for item validity.

IV. Test Construction

A. Instead of a listing of all the perceptual tests constructed, some of which have already been referred to in Sections II and III, a description will be given of one representative motion picture test, together with a brief account of the methods used to produce it.

One of the first test films planned was Speed Estimation Test III, Estimation of Relative Velocities, one of three tests requiring complex judgments of speed and motion. The intention was to construct a motion picture test requiring a complex judgment of the relations between two velocities, measured by estimating the imagined point at which the faster of two moving spots (planes) would overtake the slower. The paths of the two motions were parallel so that the judgment could not be reduced to a merely geometrical one.

Two animated planes are seen on the screen against a skyline background, one overtaking the other. Before the overtaking point is reached, both planes disappear behind a cloud and a five point scale appears superimposed on the cloud. The testee must project the two velocities and judge at which of the five points the two planes would coincide. The test consists of 50 trials, 10 at each of the five points, in a random order.

The original shots for this test were photographed by the animated cartoon department of a large commercial studio, under contract, on 35 mm. film. Detailed specifications for the frame-by-frame photography were worked out and the necessary shots were produced under the supervision of an Aviation Psychologist. Further work on the test was then carried out in the AAF film laboratory at Wright Field. The film was reduced to 16 mm., suitable for use with standard AAF motion picture sound projectors which were available at all stations. The individual items were printed and edited; the introductory directions to accompany the practice items were written and recorded on the sound track, and the items were separated by six seconds of blank film to permit recording of answers on a standard five choice answer sheet. The beginning of each successive presentation was announced by a subtitle and voice speaking the item number. A limited number of prints of this film was made for tryout. The test was then revised and re-edited with respect to time intervals, length of items, and details of photographic processing. Final prints were made and distributed. This test has been administered at all psychological testing units for the purpose of studying problems of motion picture test administration, but has not been included in the battery of classification tests. It might be noted that this test appears to measure a relatively unique perceptual function since its correlations with other tests are very low, and it is not loaded with any of the factors discovered by factor analysis of other tests in the program. The same characteristics apply to the other motion picture tests requiring judgments of visual movement and velocity.

In all, eleven aptitude tests of the motion picture type have been constructed in either a final or experimental form. Three, including the one described, are tests requiring estimation of visual velocities of

various types. One requires reproduction, on a standard answer sheet, of briefly exposed visual patterns and is intended as a test for speed of perception. Two, entitled "Flexibility of Attention" and "Integration of Attention" respectively, are efforts to measure the ability to take account of different events occurring in the perceptual field at the same time without becoming confused. Two more tests have to do with the complex ability to form unitary perceptual experiences from a series of successive partial impressions. Two require discriminations of, respectively, just noticeable movement and just noticeable direction of movement (drift), in the field of a bombsight schematically presented on the screen. One is a test of perceptual judgment of a sort which is required in aircraft landings, consisting of shots of a runway photographed at varying moments during an approach glide, with the requirement that the trainee estimate at which of five lettered points the present angle of glide intersects the runway. The principal sensory cue here, the differential pattern of movement in the optical field, is one which has not been adequately described in the experimental literature of three-dimensional vision.

V. Other Research

The research activities of the Test Film Unit and the Perceptual Research Unit will be summarized by listing a number of results and implications which are of primarily psychological interest.

A. *Color Vision.* Determinations of color vision are made routinely in the course of the physical examination for flying. In order to improve procedures, research projects on various aspects of color vision have been undertaken by the School of Aviation Medicine and by other offices under the Air Surgeon. The Perceptual Research Unit has participated in some of these studies. A job analysis of the role of color vision in the performance of various aircrew and combat crew duties was carried out. The study, performed in collaboration with a representative of the School of Aviation Medicine and of the National Research Council, employed three basic methods.

1. Interviews with flight surgeons and with aircrew personnel engaged in the training program or recently returned from combat were accomplished upon the assumption that these personnel could provide much useful information about the nature of the aircrew tasks which could be employed in constructing hypotheses concerning the color discriminations demanded. At the same time, other sources of information such as technical manuals, intelligence reports, and specifications of the color characteristics and uses of various signalling devices were examined.

2. Attempts were made to specify many of the discriminations demanded of the pilot and bombardier by flying over terrain at various altitudes and determining color specifications with the Munsell color books. Outside of finding that, under the conditions of this study, there is little loss in the chroma of the terrain viewed from high altitudes, this approach has not proved fruitful.

3. Experimental studies of the performance of individuals with varying degrees of color defect in flying situations involving hue discriminations have been performed. A definite relation between performance on color vision tests and ability to read flares and biscuit gun signals was discovered. Another study was made of the ability to detect camouflage in a sample of individuals tested with a relatively elaborate battery of color vision tests. A group of individuals who evidenced varying degrees of color defect was matched with respect to flying experience, age, rank in army, etc., to a group of normals. Both groups were flown at varying altitudes over camouflage panels which were placed on three different types of terrain backgrounds. A method for obtaining a quantitative measure of the accuracy of camouflage detection was devised. It was found that the normal group exceeded the performance of the color-defective group by a statistically significant amount although no relation between degree of defect within the color-defective group and accuracy of report could be discerned. The difference between the normal and color defective groups, although statistically significant, was so small as to be of little practical importance. Further analysis of the data revealed that the factor most closely related to visibility of a camouflage panel was the relation between the value (reflectivity, brightness, or texture) of the panel and of the background. Even at low altitudes, panels whose hue differed widely from that of the background were frequently overlooked if their values matched the background. Conversely, matches in hue were ineffective in preventing detection unless value matches were closely approximated.

Another study was made of a number of individuals with defective color vision who were in aerial gunnery training. The performance of these individuals during training was compared to that of the normal group. No differences could be discovered. On the basis of this study and of other information obtained by interview and observation, the color vision standards for gunnery training were modified. A follow-up study of those admitted under the modified requirements is now under way. The findings of the first study with respect to training has already been substantiated. It is hoped that information concerning the performance of these individuals in combat will also be obtained.

At the request of the Air Surgeon, a member of this Unit, in collaboration with a representative of the School of Aviation Medicine, made an evaluative survey of the color vision testing program of the Army Air Forces. Recommendations were made concerning the tests now employed, improvements in the method of their administration, desirable qualifying standards for various aircrew and combat crew positions, and plans for future research in color vision.

B. *Implications of Perceptual Testing for Individual Differences.* A considerable number of tests of a variety of perceptual functions have by now been administered to aviation trainees. It is a fact of some significance for psychological theory that, without exception, the tests show the existence of wide individual differences in the perceptual abilities measured, even with the homogeneous population available. Even such theoretically simple and relatively "sensory" capacities as form discrimination, color discrimination, judgment of visual extent, or absolute threshold for perception of movement appear to vary in the population in the same way as do motor and intellectual skills. The

conception of perceptual capacities or aptitudes, and along with it the notion of perceptual learning or skill, are evidently necessary for theoretical psychology.

C. *The Perceptual Equivalence of Projected Images Viewed at Different Distances and Angles.* It might be supposed by the psychologist accustomed to work in a laboratory that a group of testees cannot all be presented with visual stimuli on a projection screen in such a way as to equalize the opportunities for effective vision among all of them. The optical stimulation from the screen is different when the screen is viewed from different distances and at different inclinations from the straight-front direction. Repeated studies of the effect of seating distance and angle-of-view on the visual performances measured by motion picture tests have been made. They demonstrate that there is a surprisingly large range of perceptually equivalent seating positions in the ordinary projection room or theater. The perceived size and shape of screen images remain approximately constant despite variations in the retinal stimuli corresponding to different seating positions. There are, of course, limits to this perceptual equivalence. Depending on the type of visual judgments required by the test, scores do begin to fall off at extreme deviations from the straight-front direction and at extremely unfavorable ratios of screen size to seating distance. "Tolerances" for seating angle and seating distances in relation to the screen may be specified.

D. *The Motion Picture as a Stimulus-Response Situation.* The motion picture situation, whether it be for teaching or for entertainment, has always involved a more or less passive attitude on the part of the audience rather than an active attitude conducive to learning. The successful administration of aptitude and achievement tests by motion pictures, with instructions given in the film for the recording of answers, and pauses provided after each item for doing so, suggests that the same method could be extended with advantage to educational films for purposes of answering test questions, making objective responses, or taking notes. In particular, "recitation" and "prompting" methods are well adapted to presentation on film. It is not difficult to set up such active situations in a projection room. The film script, however, should be written by a teacher rather than by a commercial film writer. It is only necessary to provide a dim artificial illumination of about two-tenths of a foot candle in the room to permit the use of pencil and paper. This degree of illumination does not detract from the clarity of the screen image enough to be significant.

E. *The Photographic Representation of the Depth Dimension of a Visual Scene.* In the effort to devise group tests of the ability to judge position and distance in the three-dimensional space of the flyer, a considerable amount of research has been done on how to represent

photographically three dimensional space. Theoretically, all the sensory cues for space perception can be represented in photographs (still and motion picture), excepting only the binocular cues. This representation is subject to artificialities introduced into the situation by the visible flatness of the screen or photograph and the visible margins surrounding it. Efforts are being made to control and represent systematically the important monocular sensory cues in still and motion picture photographs. For purposes of aviation, many of these cues have not been adequately described in the literature. It appears that a photographic test for tridimensional space perception is possible.

F. *Research on Aircraft Recognition Training.* The training of Air Corps personnel in the identification of friendly and enemy aircraft is both universal and continuous in the training program. This type of training has no academic parallel, and hence educational research on this type of learning was lacking when training was instituted. In order to evaluate certain training methods a program of research has been carried out by this unit, largely in the aircraft recognition classes at the Santa Ana Pre-flight School.

Training in the identification of aircraft in flight seems to be primarily a matter of perceptual learning. It involves concept formation from a large number of relatively meaningless visual forms which, being mutually similar, are not at the outset distinctive. The training material is primarily photographic views of the aircraft to be learned, in the form of slides and motion pictures supplemented by silhouettes and shadow-views of airplane models. The basic method is the repeated exposure of these views. The uniform content of such courses, and the simplicity of the learning situation involved make them almost ideal laboratories for the study of perceptual learning and methods of promoting such learning.

One of the main facts emerging from such a study is the evident importance of the principle of immediate reinforcement for perceptual acts as well as for verbal and motor acts. Although some perceptual learning takes place without intention, and without immediate conformation or correction of the identification response, learning is much more efficient when every view is identified actively and then corrected or confirmed immediately.

Another conclusion regarding visual recognition is that learning is dependent on the frequency with which the views are exposed, i.e., the frequency of the acts of perception, but not at all on the duration of the individual exposures. The evidence indicates that the efficiency of learning produced by, say, 1,000 presentations is the same whether the views are exposed for only 1/50 sec. or for several seconds apiece. This conclusion is of particular interest because of the assumption, which has

been made, that instantaneous exposures promoted instantaneous recognition.

G. *Achievement Tests in Aircraft Recognition.* Experiments on the effectiveness of different techniques of recognition training have necessitated the development of tests for the measurement of proficiency in aircraft recognition. The motion picture medium is particularly well adapted to this type of testing, since it makes possible the presentation of realistic views of airplanes under natural and varied conditions of movement, position, lighting, and background. The development of these test films suggests many possibilities of the usefulness of motion picture achievement testing, particularly in those fields in which motion and tridimensionality constitute essential aspects of the subject matter.

The Psychological Test Film Unit expects to continue a number of the research projects described or referred to, with added emphasis on training problems.

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THE MOBILIZATION OF PSYCHOLOGISTS FOR WAR SERVICE

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The allocation of psychologists for service in the war effort has involved problems and procedures which are significantly different from the pattern in other professions. Certain fields, such as medicine and engineering, were immediately recognized as critical occupations, and an official mechanism was provided to guarantee an adequate supply for essential civilian activities and for military service. The War Manpower Commission, through the National Roster of Scientific and Specialized Personnel, directed by Dr. Leonard Carmichael, was asked to advise with Selective Service in determining occupational deferment in these professions. On the other hand, fields such as law and social work were not considered critical occupations and their members were inducted through regular channels. Psychology seems to fall somewhere between these two groups. There is a continuing demand for psychologists in both military and essential civilian service—a demand which could not be adequately met with the existing supply of trained personnel. During the first year of the war psychology was listed as a critical occupation by Selective Service, but this listing was dropped in 1943 when the military needs appeared greater than the civilian.

Although there has been no official control of the mobilization of psychologists, this does not mean that there has been no planning or direction of any sort. It is clear from the extensive correspondence in the Office of Psychological Personnel that individual psychologists have sincerely faced the question of where they could be of most service and have acted accordingly. Universities and other employers have surveyed their needs carefully, releasing certain employees for service elsewhere, and asking deferment for those who were essential in their present work. Local draft boards, in the absence of specific official instructions, have granted deferment to some essential psychologists in civilian positions.

A recently completed survey of all psychologists offers an opportunity to study the results of this mobilization procedure. The survey was conducted by the Office of Psychological Personnel during December, 1943 and January, 1944. Questionnaires were sent to all members of the national, regional and local societies of psychologists, to all who had registered with the National Roster or the Office of Psychological Personnel, and to others whose names were available from lists of military personnel. Returns were received from 84 per cent, and incomplete information was available for most of the others from directories and service records.

Number of psychologists. Previous estimates of the total number of psychologists have been derived from a variety of data and have ranged from 3,500 to 8,000. The present survey included all members of the American Psychological Association and the American Association for Applied Psychology, and all others who were qualified for membership in either organization (Ph.D. in psychology, or employment in psychological work after one or more years of graduate training in psychology or a cognate field). From these sources 4,553 psychologists were located of whom 3,806 are members of the American Psychological Association.

TABLE I

WAR ACTVITIES OF PSYCHOLOGISTS

	M.A. Degree	*Ph.D. Degree*	*Total*
Total number of psychologists	**1908**	**2645**	**4553**
Men	1179	2012	3191
Women	729	633	1362
Military service	**528**	**478**	**1006**
Army enlisted	121	38	159
Army commissioned	134	144	278
Army Air Force enlisted	98	21	119
Army Air Force commissioned	39	80	119
Navy enlisted*	8	5	13
Navy commissioned*	118	180	298
Discharged	10	10	20
Civilian service			
Full-time government employment	**147**	**290**	**437**
U. S. war agencies	96	146	242
Office of Scientific Research and Development	51	144	195
Part-time war service	**74**	**249**	**323**
Consultant, war agencies	8	81	89
Member of national committee	1	32	33
Testing for induction centers and Civil Aeronautics program	65	136	201
Local volunteer activities	155	252	407

* Including Marines, Coast Guard, and Maritime Service. The discrepancy between these figures and the total of 415 commissioned Naval officers reported by Louttit (*Psychol. Bull.*, 1944, 41, 253–257) results from the inclusion in the latter article of more than 100 individuals listed as psychologists but not meeting the minimum requirements for inclusion in the present survey.

Military service. A total of 1,006 psychologists have entered the Armed Forces. Thirty-three of these are women, most of whom have been commissioned in the WAVES. The numbers in the several branches of the service are shown in Table I.

It is the opinion of officers of the National Roster that a greater proportion of psychologists are in military service than is true of most other professional groups. The survey offers evidence in support of this opinion. There are 1,487 male psychologists between the ages of 18 and 38, of whom 948, or 64 per cent, are in service. The proportion of the general population in military service is approximately 50 per cent.

The reason for the disproportionate number of psychologists in military service is related to the magnitude of the military needs. Consequently there has been double motivation for psychologists to enter military service: the draft boards have been exerting pressure at one end, while at the other the services have eagerly recruited volunteers through the offer of commissions and the opportunity for professional service.

TABLE II

EDUCATION, RANK AND ASSIGNMENT OF GRADUATES OF THE ARMY SPECIALIZED TRAINING COURSE IN PERSONNEL PSYCHOLOGY

	Per Cent
Education	
Less than four years of college	34.2
A.B. degree in psychology	4.9
A.B. degree in other fields	34.8
Graduate school in psychology	6.0
Graduate school in other fields	20.1
Rank	
Private	4.6
Private First Class	51.8
Corporal	27.3
Sergeant	16.3
Assignment	
Classification	
Army Air Forces	16.1
Army Ground and Service Forces	26.5
*PRU or MPEU (AAF)	15.6
Special Training Units	9.8
Medical Corps	1.1
Test Construction	1.7
Mental Hygiene	1.7
Rehabilitation	.7
Office of Strategic Services	.6
Other psychological duty	2.2
Non-psychological duty	16.4
Unassigned	7.6

* Psychological Research Unit or Medical and Psychological Examining Unit.

Commissions have been available for 70 per cent of those who entered the armed forces and for 86 per cent of those with the Ph.D.

degree. It will be noted that the Navy practice has been more favorable in this respect than the Army's. During the past year the general policy of the Army has been such that almost no direct commissions were available for psychologists and no schools for officer candidates in psychological fields were conducted.

ASTP training in psychology. The need for psychologists as classification specialists and personnel consultants was not adequately met by the supply from Selective Service, and in 1943 the Army established a course in Advanced Personnel Psychology in the Army Specialized Training Program. Approximately 1,300 enlisted men completed the intensive six-month course at eleven selected universities. Table II shows the educational background and present assignment of these men, based upon returns from 956 men in response to a special survey.

Civilian service. Government war agencies have recruited many psychologists for civilian service in the War and Navy Departments, the

TABLE III

EMPLOYMENT OF PSYCHOLOGISTS JANUARY 1941 AND JANUARY 1944

Employment	*1941*			*1944*		
	Men	*Women*	*Total*	*Men*	*Women*	*Total*
Universities and colleges	1506	369	1875	1104	397	1501
Schools and educational systems	200	224	424	134	228	362
Guidance centers, clinics	100	115	215	79	123	202
Prisons, correctional institutions	76	20	96	53	27	80
Hospitals, custodial institutions	87	59	146	80	103	183
Business, industry, consulting organizations	140	38	178	187	58	245
Public personnel agencies (USES, etc.)	66	7	73	48	20	68
Government agencies	100	27	127	71	33	104
Self-employed	62	34	96	51	34	85
Total	**2337**	**893**	**3230**	**1807**	**1023**	**2830**
U.S. war agencies (including (OSRD)	10	1	11	234	42	276
Military service	9	2	11	953	33	986
Total	**19**	**3**	**22**	**1187**	**75**	**1262**
Advanced graduate students	180	94	274	113	84	197
Non-employed, retired	52	67	119	53	141	194
No information available	81	72	153	37	33	70
Grand Total	**2669**	**1129**	**3798**	**3197**	**1356**	**4553**

Office of Strategic Services, the Office of War Information, and particularly in the Office of Scientific Research and Development, which contracts with universities and other institutions for research projects directly requested by the armed services. The turnover of personnel in government war agencies has been considerable, and the numbers

presented in Table I include those psychologists who at any time were employed in the work indicated. Table III shows the number actually employed at the time of the survey.

Regular employment. Table III shows that 1,240 psychologists have shifted from their regular employment to the military service or to war agencies. It would be expected that this shift would leave large gaps and dislocations in civilian activities, and in many instances this has been the case. The over-all picture, however, is not too devastating. The total number of psychologists engaged in usual employment has decreased by 400—and this decrease is almost entirely in university employment. In all other categories of employment the increases and decreases have been small, although there has been a considerable lowering of standards as graduate students and others are called into full-time positions.

The apparent discrepancy between the number who have been drawn into war service (1,240) and the decrease in regular employment (400) can be explained by the increase in the total number of psychologists. In normal times the membership of the American Psychological Association increases by about 300 a year. During the past three years this influx of new psychologists from the graduate schools has not been quite enough to balance the number in war service.

During the years of war mobilization there has been an increase in the proportion of women psychologists in civilian employment. While the number of men has decreased 20 per cent, the number of women has increased 15 per cent, which is no greater than the normal expected growth.

The results of the survey will be further analyzed and reported in later articles dealing with the post-war reemployment problem, and with the employment, functions, and training of the various occupational groups of psychologists.

PERSONNEL-PSYCHOLOGISTS AT STANFORD UNIVERSITY

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A class of 109 soldiers was selected by the army to attend a two-quarter training course in personnel-psychology at Stanford University beginning in May 1943. This constituted one of eleven such courses, totalling approximately 1,350 men (4).

Certain data concerning the men trained at Stanford University throw some light on four problems, namely, the validity of ratings, the relation of interests to achievement, the relation of morale to achievement and the factors to be considered in selecting soldiers for training to be personnel-psychologists.

Both soldiers and faculty expressed the feeling that the class contained individuals who should not have been included. Have we learned anything from the experience that would enable the army to select men more wisely next time? This, the last of the above four problems is the central theme of the report: the other three contributions are by-products but worthy of note.

The basis of selection of men for the course, as the writer understands it, was:

1. a score of 115 or higher on the Army General Classification Test (AGCT), that is, from the upper 24 per cent of the white men in the army,*
2. the soldier's willingness to return to college,†
3. the approval of a board of army officers after interview of the student at the camp and the approval of the STAR board at the educational institution, and
4. completion of three courses in psychology.

Actually all the men had scores of 118 or higher on the AGCT (see Table V) but eleven had had no instruction in psychology. Although presumably most of the men had agreed to return to college many of them complained that they had not been consulted as to what instruction they were to receive and claimed that they would not have elected the course if they had had a choice. No check has been made regarding the *fact* that they were consulted or not concerning the personnel-psychologist course nor as to how many *felt* that they had had no choice in the matter.

There is no question, however, that both students and faculty freely discussed a bad morale situation, attributing the cause primarily to the presence

* Major T. W. Harrell states that 6 per cent of white men processed at reception camps scored 130 and above and 28 per cent scored 110 to 129. By interpolation 24 per cent scored 115 and higher.

† Certain statements made to the writer indicate that many of the men first selected for the ASTP program were not given any option in the matter.

of men who did not want to be there and to the uncertainty of future assignments. How much faculty and students were upset by operating college courses under the direction of army men is unknown, but the writer knows he neither expected nor got from the class as a whole the standard of performance he does get from regular students. There were, however, many able men in the class who did satisfactory work.

Originally the class contained 109 men. Thirteen were terminated by the beginning of the second quarter—seven were transferred to other work and six were dropped because of unsatisfactory scholarship. One of the remaining 96 men was so irregular in his attendance during the second quarter that he has been ignored in most of the tables below.

TABLE I

AVERAGE GRADES IN COURSES

Course	*95 Men**	*6 Men*	*101 Men*
Tests and Measurements	5.4†	10.5	5.7
Social Psychology	5.5	9.5	5.7
Statistics	5.3	10.5	5.6
Occupations	5.5	11.5	5.9
Average of 4 courses	5.5**	10.5	5.7
Personnel Procedures	6.2		
Work, Fatigue and Efficiency	6.5		
Interviewing	5.2		
Abnormal Psychology	6.1		
Learning and Perception	4.5		
Average of 5 courses	5.7		

* In second quarter grades are based on 92 cases. 3 did not finish the quarter.

† Grade of A=1, B=4, C=7, D=10, F=13.

** σ=2.6.

Average grades for the nine courses are given in Table I. In all but the Learning course the distribution of grades approximates the Stanford regulations of assigning A to approximately 15 per cent of students, B to 35 per cent, C to 35 per cent and D to 15 per cent of students who pass the course. There are, however, somewhat less than 15 per cent of D grades in six of the eight classes. The distribution of grades in the Learning course is markedly skewed with 26 per cent of A grades, 46 percent of B, 20 per cent of C, 2 per cent of D and 6 per cent of failures. Even when the records of the three students who were dropped during the second quarter are ignored the grades assigned in the first four courses of the second quarter are lower than the grades of the first quarter—a drop of eight per cent of B grades and a corresponding increase of D and failing grades. Either the faculty raised their standard or the students did poorer work.

Average grades in the first quarter correlate .74 with average grades in the second quarter. Grades in several courses agree better than this

but grades in Statistics and Learning vary appreciably from the remainder. Table I presents the average grades in the courses of the 95 men who started the second quarter, the 6 men who were dropped for poor scholarship at the end of the first quarter and the total of 101 men.

Previous Education. Did "number of years of college education" effect the scholastic achievement in this army training program? Also, did "number of courses previously taken in psychology" affect success in the two quarter course largely devoted to psychology courses? If so, would it be possible next time to secure a better sample of army personnel-psychologists by establishing some requirement as to years of college attended and number of psychology courses attended?

TABLE II

YEAR IN COLLEGE AND SCHOLASTIC ACHIEVEMENT IN THE TWO-QUARTER PROGRAM

Year in College	*No.*	*Mean Grade*	*Median Grade*	*Q*
1	6	7.1	5.8	2.5
2	21	6.0	5.8	1.3
3	24	6.1	6.2	1.7
4	36	5.5	5.5	1.7
5–7	9	3.5	3.4	1.9

Table II shows that 36 of the 96 students who started the second quarter were in their senior year when they entered the army, 45 men were in their sophomore and junior years, 6 were freshmen and 9 graduate students. Mean grades suggest a very slight improvement in performance with increasing attendance at college but median grades do not support such a trend. Graduate students did, however, do better work than undergraduates, there being an actual difference of 2/3 of a letter grade, which is statistically significant.

Thirty-two of the men had had the required three previous courses in psychology as shown in Table III. Eight more might be said to meet the requirement as their course in Statistics could well be accepted as a substitute for a third psychology course. This gives a somewhat smaller percentage of men meeting the scholastic requirement than at the University of Chicago (4). Actually 11 men had had no psychology course, 40 had had one course, 32 had had two to three courses, and 13 had had four to six courses. The differences in scholastic achievement are very slight with zero to three courses; what differences there are support the suggestion that no course was a better preparation than two or three. The faculty had the feeling that students with no previous work in psychology felt badly handicapped and worked harder to make up the difference. Whatever the explanation, the fact remains that no previous work in psychology did not prevent satisfactory work. Students with four or more courses did better work than the remainder.

TABLE III

NUMBER OF PSYCHOLOGY COURSES PREVIOUSLY TAKEN AND SCHOLASTIC ACHIEVEMENT IN THE TWO-QUARTER PROGRAM

No. of Courses in Psychology	*No.*	*Mean Grade*	*Median Grade*	*Q*
0	11	5.5	5.7	2.2
1	40	5.8	5.7	1.6
2	13	6.1	6.1	1.5
3	19	6.1	6.0	1.6
4	7	4.6	4.0	1.4
5–6	6	4.1	3.6	0.7

The data in Tables II and III do not include six students who were dropped at the end of the first quarter for scholastic reasons. Their records should be included in this discussion. Data regarding these six soldiers, 3 who had unsatisfactory records and were dropped early in the second quarter and 5 who were dropped at the end of the second quarter, are given in Table IV. These 14 men averaged 2.3 years of college in contrast to 3.2 years for those who succeeded. The former averaged 1.7 courses in psychology in contrast to 2.0 courses for the latter. Neither of these differences is statistically significant.

The criterion of success in this personnel-psychologist course should presumably be successful performance in the army. Neither this criterion nor any close approximation to it is available against which to to check the effectiveness of the training program. It was necessary for students to obtain passing grades from their instructors in order to be continued in the course by the army authorities. Absence of failing grades constituted then a very important part of the total criterion.

Using college grades as the criterion, it is apparent that if only graduate students with four or more courses in psychology had been selected much better grades would have resulted. Since so many excellent men would have been eliminated it is apparent that such a procedure is not practical. It can be agreed, and with justification, that the more advanced students received high grades to a considerable degree because of previous learning, and that their A grades represent less learning than grades of B and possibly C secured by men of no previous psychological instruction. With such complications we cannot cope, however, in this short study. The data, as far as they go, do not support the common custom of requiring elementary psychology before entrance to more advanced courses nor to the restricting of advanced courses to upper division students.

Intelligence. One of the requirements for admission to the Army Personnel-Psychologist Course was a score of 115 on the Army General Classification Test (AGCT). All of the men met this requirement having a range of scores from 118 to 156 and a mean score of 136.7. This is practically the same mean as reported at the University of Chicago, i.e., 134 (4).

TABLE IV

YEARS OF ATTENDANCE IN COLLEGE AND NUMBER OF PSYCHOLOGY COURSES TAKEN BY STUDENTS WHO FAILED IN COMPARISON WITH STUDENTS WHO PASSED

	N	*Average Number of Years in College*	*Average Number of Coursex in Psychology*
Dropped at end of 1st Quarter	6	2.2	2.0
Dropped during 2nd Quarter	3	3.0	2.0
Dropped at end of 2nd Quarter	5	1.9	1.2
Total dropped	14	2.3	1.7
Total of those who completed the program	88	3.2	2.0

Nearly all the men completed the American Council on Education Psychological Examination (ACE). The distribution of scores on the two tests for the 104 men who took both tests is given in Table V. Mean scores are nearly equal but the standard deviation on the ACE is approximately twice that on the AGCT test. The correlation between scores on the two tests is only .492, suggesting that scholastic achievement may be differently associated with the two tests.

Distribution of the scores of the 14 men who were dropped for unsatisfactory work is given in Table V; also the distribution of scores of the 14 men who obtained the highest scholastic grades. There is very little difference between these two extreme groups on the AGCT test, i.e., 7.6. On the ACE test the difference is 21.0 which suggests that this test is superior to the AGCT in differentiating superior and inferior

TABLE V

DISTRIBUTIONS OF SCORES OF 104 MEN WHO TOOK BOTH THE AGCT AND THE ACE TESTS

Scores	*AGCT*	*ACE*	*Average*	*14 Who Were Dropped*		*14 with Highest Grades*	
				AGCT	*ACE*†	*AGCT*	*ACE*
170		1					
160		8	1				2
150	6	13	10			2	4
140	34	14	22	4	1	5	2
130	39	23	31	2	4	5	3
120	20	18	26	6	2	1	1
110	5	23	6	1	4	1	3
100		3			1		
90		0					
80		1			1		
Mean	136.7	134.4	135.8	131.6	121.8	139.2	142.8
σ	9.39	17.5*	10.6				

* σ of 103 cases, omitting score of 81, =16.8.

† One of the 14 men did not take the ACE test. His score on the AGCT was 123.

TABLE VI

MEAN SCHOLASTIC GRADES OF 95 MEN IN RELATION TO THEIR INTELLIGENCE TEST SCORES (AGCT AND ACE TEST SCORES AVERAGED)

Courses	*Intelligence Test Scores*				
	110–129 N = 31	*130–144 N = 45*	*145 N = 19*	*Difference 1st and 3rd Groups*	*Critical Ratio*
Average of 4 courses, 1st Quarter	6.4	5.3	3.9	2.5	4.5*
Average of 9 courses, 2 Quarters	6.1	5.6	4.6	1.5	2.3

* When 10 additional men, who had failed or been transferred to other work, are included the three mean grades are, respectively, 7.4, 5.4, and 4.6, a difference of 2.8 with a critical ratio of 4.1. Two of the men transferred elsewhere had high intelligence and low grades of C− and D.

scholarship. But the correlations between grades and AGCT and ACE do not support this hypothesis since the former is .31 and the latter only .34.

The data in Table VI indicate that during the first quarter those with high intelligence averaged 2.5 thirds of a letter grade higher than those with low intelligence—a statistically significant difference. But the difference between the two groups dropped to 1.5 thirds of a letter grade when grades for all 9 courses are considered.

Correlation between grades in the nine courses and intelligence test scores are given in Table VII. The results in the preceding table should prepare us for the fact that the correlations are lower during the second

TABLE VII

CORRELATION BETWEEN SCHOLASTIC ACHIEVEMENT AND INTELLIGENCE, PSYCHOLOGIST INTEREST AND PERSONNEL INTEREST

Courses	*N*	*Intelligence*	*Psychologist Interest*	*Personnel Interest*
Tests and Measurements	95	.355*	.318	
Social Psychology	95	.150	.336	
Statistics	95	.257	.138	
Occupations	95	.287	.246	
Average of 4 courses	95	.330	.314	.225
Personnel Methods	93	.089		
Work, Fatigue, Efficiency	93	.064		
Interviewing	93	.235		
Abnormal Psychology	93	.200		
Learning	93	−.060		
Average of 9 courses	93	.197	.275	.230

* The standard error of a zero correlation with population of 95 is .103. On this basis only coefficients of .31 or higher are statistically significant. Omitted coefficients are statistically insignificant.

quarter than the first quarter, as the table makes clear. In both cases the coefficients are low, i.e., .33 and .20, respectively. If data on ten additional men who failed the first quarter or were transferred elsewhere are included, the coefficient of .33 is raised to .43.

There is no evidence here that raising the minimum AGCT test score above 115 for admission to the course would have appreciably improved the scholarship. To have raised the requirement to 120 would have eliminated one poor student, three satisfactory and one superior; to have raised the minimum to 130 would have eliminated seven failures, sixteen satisfactory and two superior students.

Interests. A slogan frequently displayed in army personnel offices is: "Place the man in the work he can do and likes the best." From the comments of many members of this class it is evident that they felt they had not been consulted as to whether or not they would like to become personnel-psychologists. Several secured transfers to other work early in the course. Scores on the Vocational Interest Test make clear that the class was very heterogeneous in their interests and that many did not have the interests common to personnel managers and especially to psychologists.

The distributions of psychologist and personnel manager interest scores of the 95 men who began the second quarter are given in Table VIII.

TABLE VIII

PSYCHOLOGIST AND PERSONNEL MANAGER INTEREST SCORES OF THE 95 PERSONNEL-PSYCHOLOGISTS.

Rating	*Score*	*Psychology Interest*	*Personnel Interest*	*Higher of Either Psychology or Personnel Interest*
A	60		5	5
	55	1	2	3
	50	4	18	20
	45	3	8	9
B+	40	3	16	16
B	35	5	18	17
B−	30	4	7	6
C+	25	10	11	11
C	20	13	3	3
	15	12	4	5
	10	12	1	
	5	9	2	
	0	6		
	−5	6		
	−10	6		
	−15	1		
Mean		18.9	40.0	41.4
σ		16.1	12.4	

On the average these men have a B+ rating in personnel but a low C rating in psychology. In fact their average score in the latter is equal to what would be obtained by chance. On the basis of interest scores alone we would advise 8 of the 95 men to become psychologists and 33 to become personnel men. Considering both A, B+ and B ratings we would consider 16 of the 95 for psychologist and 67 of the 95 for personnel work.

If we consider that a man is qualified for this army course if he has a high interest score as either a psychologist or a personnel man we find from the distribution of such scores (last column in Table VIII) that 37 men rate A and 33 more rate B+ or B, a total of 70 among 95. This leaves 25 men with ratings of B− and lower. Even on this basis a fourth of the men are presumably not being fitted for work in harmony with their interests.

When the interest records of the 95 men are averaged for each occupation we have the following ratings typical of the group as a whole:

Rating of B+	Office worker
	Realtor
	Social science teacher
Rating of B	Personnel manager
	Sales manager
	Accountant
	Life insurance salesman
	Purchasing agent
	Advertising man

Such an interest profile approximates that of the average business man, except that the latter would also have a B+ rating in production manager.

All scientific interests are rated low, i.e., engineer and chemist (22), physician (20), psychologist, architect and dentist (17) and mathematician (15). Such interests correlate .40 to .77 with those of psychologists and −.08 to −.51 with the interests of personnel men.

If we consider the highest occupational interest of each man we have the following distribution of interests.

12.7*	Personnel manager
9.1	Office man
8.3	Social science teacher
6.5	Accountant
6.5	Sales manager
5.3	Lawyer
4.3	Realtor
4.0	Farmer

* When two or more occupations are tied for a man's highest score, each occupation is given proportionate weight.

3.8 Advertising man
3.8 Mathematics-science teacher
3.5 Purchasing agent
3.5 Aviator
3.0 Life insurance salesman
2.0 Each of Printer, Banker, President and Production manager
1.5 Psychologist
1.3 Certified public accountant
1.0 Each of Y.M.C.A. physical director, Forest service and Chemist

Such interest scores indicate a heterogeneous group of men, the majority having business interests of various aspects except that of production, with the interests of personnel men being more common than any other. The group contains few men with any kind of scientific interests—so few in fact as to make certain that it is not a random sampling of college students. Our guess is that men with scientific interests were directed into engineering, medicine and other similar pursuits and the remainder were considered for personnel-psychologist. Such a program is permissible as far as selecting personnel men is concerned but will not provide men with the scientific interests found among psychologists.

What relationship exists between interest scores and scholastic grades? Several correlations between psychologist interest scores and grades are given in Table VII. They approximate the correlations between intelligence and grades for courses in the first quarter and are slightly higher for the second quarter. Correlations between personnel interest scores and grades are lower than those concerning intelligence or psychology interest during the first quarter and about equal to them for both quarters. In general, grades correlate about equally with intelligence and psychologist interest during the first quarter and correlate slightly higher with the latter than the former during the second quarter.

Correlations do not always reveal the extent to which the superior and inferior in one respect are differentiated in a second regard. Table VI shows that during the first quarter the superior in intelligence earn 25/30 higher letter grade than the inferior (critical ratio of 4.5), Table IX shows similarly that the superior in psychology interest scores earn 23/30 higher grades (C.R. of 4.1) and Table X shows that the superior in personnel interest scores earn 15/30 higher grades (C.R. of 2.3). For the entire two quarters the differentiation is less in all three respects—here the superior in psychology interest scores earn 2/3 higher grades than the inferior (C.R. of 3.1) and the superior in both intelligence and personnel interest earn only 1/2 higher grades with critical ratio of 2.3.

Several complications must be taken into account:

1. The range of intelligence scores is greatly restricted in contrast to the wider distribution of interest scores, which implies that higher correlations

TABLE IX

MEAN SCHOLASTIC GRADES OF 95 MEN IN RELATION TO THEIR PSYCHOLOGY INTEREST SCORES

Course	*−15 to 14 N=40*	*15 to 29 N=35*	*30 to 59 N=20*	*Difference 1st and 3rd Groups*	*Critical Ratio*
Tests and Measurements	6.1	5.7	3.0	2.9	5.2
Social Psychology	6.5	5.3	3.7	2.3	3.6
Statistics	5.6	5.5	4.3	1.3	2.0
Occupations	6.4	5.4	4.1	1.9	2.9
Average of 4 courses	6.1	5.4	3.8	2.3	4.1
Personnel	6.3	6.5	5.7	0.6	—
Work, Fatigue, Efficiency	6.9	6.6	5.5	1.4	1.4
Interviewing	5.7	5.7	3.4	2.3	3.2
Abnormal	6.9	6.4	3.8	3.1	3.4
Learning	4.8	4.1	4.6	0.2	—
Average of 9 courses	6.4	5.7	4.4	2.0	3.1

TABLE X

MEAN SCHOLASTIC GRADES OF 95 MEN IN RELATION TO THEIR PERSONNEL INTEREST SCORES

Course	*5 to 29 N=21*	*30 to 44 N=41*	*45 to 64 N=33*	*Difference 1st and 3rd Groups*	*Critical Ratio*
Tests and Measurements	6.2	5.3	4.9	1.4	1.6
Social Psychology	6.8	5.7	4.5	2.3	3.1
Statistics	5.6	5.1	5.0	0.6	—
Occupations	6.3	5.9	4.5	1.8	2.4
Average of 4 courses	6.4	5.5	4.9	1.5	2.3
Personnel	6.6	6.5	5.6	1.0	—
Work, Fatigue, Efficiency	6.1	6.9	6.2	−.1	—
Interviewing	6.2	5.4	4.4	1.8	2.1
Abnormal	6.8	6.2	5.5	1.3	—
Learning	4.9	4.8	3.8	1.1	—
Average of 9 courses	6.6	5.9	5.1	1.5	2.3

might be expected with intelligence than with interest scores if a good sample of men in general was available.

2. Only a few score high on the psychologist interest scale thereby preventing a fair comparison between those rating A and those rating C. It is possible that better differentiation might be obtained with this scale if there was a good representation of men with A ratings.

3. The personnel interest scores contain 33 A ratings but no scores below zero. A better measure is possible here than with the other two tests but higher correlations should be expected if there were scores below zero.

Since psychology and personnel interest scores of these men correlate .28* it seemed likely that some combination of the two sets of

* When the records of 285 college seniors are correlated a coefficient of −.08 is obtained instead of .28. See (3 Table 193).

interest scores might provide better differentiation than either one alone. Averaging the two sets of scores gives about the same differentiation as secured with psychology interest scores alone and better differentiation than obtained with only personnel interest scores.

Averaging the two sets of interest scores is one possible way of combining such scores. It can be argued that possession of high interest in either field would be sufficient to provide proper motivation for all courses since they are required for advancement in the two fields in the army. Slightly less differentiation was obtained, however, between superior and inferior students when the higher score in the two fields was alone used than when the two scores were averaged.

Neither of the two interest scores differentiated satisfactorily the superior and inferior students in statistics. Accountant and mathematician interest scores differentiated such students even less well than psychology interest scores.

As a check upon the above calculations we determined the differentiation between superior and inferior students using advertising interest scores. This scale was selected as scores on it correlate about zero with scores on both the psychology and personnel interest scales. The differentiation here was −.1, that is, the students with low scores averaged 1/30th of a grade higher than the students with high scores.

Psychology interest scores correlate .38 with scores on the Thorndike Intelligence Examination for High School Graduates (see Strong 3 Table 193) but these interest scores correlate only .20 with an average of the scores on the AGCT and ACE. Corresponding correlations with personnel interest scores are −.02 and .05. Since psychology interests correlate higher with intelligence than do personnel interests it is natural to suppose that the better differentiation of superior and inferior stuents with the psychology scale than with the personnel scale is attributed to the former's association with intelligence. When intelligence is partialed out the correlation of .314 between psychology interest and grades is reduced to .248 and when psychology interest is partialed out the correlation of .330 between intelligence and grades is reduced to .288. The approximately equal partial coefficients suggest that both intelligence and psychologist interest contribute about equally to grades in these courses.

The relation of interests to ability has not yet been satisfactorily determined. One difficulty in making such studies has been the lack of proof that the interest test measurements reflect the interest that is being investigated. A second difficulty has been to secure data on people engaged in the activity who have low interest scores. Among several hundred engineering students, for example, practically none had low engineering interest scores although there were many non-engineer-

ing students with high engineering interest scores. The above data are significant in this respect that they include a wide range of interest scores. The fact that such interests are related to achievement to the same extent as is intelligence is significant, even though in this case all the correlation coefficients are low.

It is obvious that a better selection of students could have been obtained if only those with B+ and A ratings in personnel and especially psychology had been selected. But as in the case with intelligence test scores, to do this would have resulted in the elimination of many men who did perfectly satisfactory scholastic work.

Occupational interest scores were designed to measure not scholarship but turnover, i.e., extent to which people would like the work and continue in it. We do not have the opportunity to determine the real validity of the interest scores for lack of a criterion involving both performance and continuance in the work for an appreciable period of time.

Morale. Another factor that may have influenced grades in this training course is morale. As a class exercise in the course on Personnel Procedures, the students recorded their attitudes on Wood's morale test; called by him Segment Evaluation Scale (5). The employees tested by Wood averaged 7.0 on a scale from 1 to 10; the personnel-psychologists averaged 6.0, indicating somewhat poorer morale.

A comparison of the mean scores of the two groups by segments follows, differences of 1.0 or more alone being reported.

	Wood's Employees	*Personnel-Psychologists*	*Difference*
Favors	6.3	7.5	1.2
Plans	7.4	6.2	−1.2
Suggestions	7.8	6.6	−1.2
Interests	7.0	5.6	−1.4
Career	7.0	5.6	−1.4
Instructions	7.7	6.2	−1.5
Responsibilities	8.6	7.1	−1.5
Advancement	6.8	4.9	−1.9
Outside influences	7.6	5.4	−2.2
Nature of work	8.3	3.8	−4.5

Evidently, it was the nature of the work they were engaged in that most annoyed these soldiers.

There was no relationship between intelligence and morale, as measured here, for those with morale scores of 6.0 to 8.3 averaged 135.4 in intelligence and those with morale scores of 2.8 to 5.9 averaged 137.6. During the first quarter grades of the soldiers with above average morale averaged 4.8 and those with below average morale averaged 5.5, a difference of 7/30 of a letter grade (correlation of .21). The corresponding averages during the second quarter are 4.6 and 6.4 a difference cf 18/30 of a letter grade which has a critical ratio of 3.2 (correlation of .28). The

closer agreement between grades and morale during the second quarter than the first quarter is appropriate since the morale test was administered during the second quarter.

The relationship between morale and grades during the second quarter is probably greater than that indicated above for 15 soldiers were either absent or did not turn in their blanks. Ten of the 15 constituted 10 among the 11 men who had average grades of D and less during the second quarter.

When the class is divided into two groups according as their grades are higher or not in the second quarter than the first quarter, we find the intelligence test scores of the two groups to be 130.9 and 138.5, respectively, and the morale scores to be 6.6 and 5.3 respectively. (The difference in intelligence test scores has a critical ratio of 2.5 and the difference in morale scores has a critical ratio of 3.3.) The tendency is for men below average in intelligence and above average in morale to improve their grades and for men above average in intelligence and below average in morale to do poorer work in the second quarter than the first.

Many of the superior students had below average morale scores but none of the students with grades of B− and lower had above average morale scores. It would be interesting to know whether (1) poor morale causes poor scholarship but that good morale does not produce good scholarship or (2) poor grades cause poor morale but good grades do not produce good morale.

Hersey found that "men are more productive in a positive emotional state than in a negative" (difference of 8.5 per cent) (1, pp. 289–290). But it is to be noted that employees with positive emotion exceeded those with neutral emotion by only 1.4 percent whereas employees with negative emotion dropped below those with neutral emotion by 7.1 per cent. Positive emotion increased production very little but negative emotion affected production appreciably. His conclusion is in harmony with our finding that poor morale has more effect upon achievement than good morale, or that good grades affected morale less than poor grades.

Grumbling or complaining is indulged in by many men. Such is the inalienable right of the enlisted men according to one authority. A general confided to the writer that he would be most seriously disturbed if he heard that his men were not complaining. Whether such conduct is merely a form of conversation or symptomatic of bad morale is unknown to the writer. Attitudes supposedly measured by morale scales is another phenomenon. What a man will do in action is still a third phenomenon. In this study we do not know how well Wood's scale measures what it purports to measure. We know that the scores are related somewhat to grades. Grades are important to the extent that

poor grades eliminate the man from the program.* We do not know whether the morale scores are related to subsequent performance on the job.

Ratings by students. Each student rated himself and was rated in turn by five members of the class on the rating scale given by Pennington et al. (2, pp. 182–183). This scale is "used in selecting candidates for the officer's training school." Several additional items were included. Only three items are considered here pertaining to a good worker, i.e.: "He shows persistent energy on the job," "He finishes work he begins," "Would you select him as your assistant in charge of research for which you are responsible?". On the first two of these items the ratings ranged from 0 to 2 and on the third item from 1 to 5. For the three items the possible range was from 0 to 9, the actual range was 3.8 to 9 with an average of 7.3 for the averages of five student ratings on a fellow student.

To show that there was appreciable discrimination in the ratings these correlations are given.

Average of ratings pertaining to "bearing" vs. average of ratings pertaining to "leadership"	.83
Average of ratings pertaining to "bearing" vs. average of ratings pertaining to "good worker"	.39
Average of ratings pertaining to "leadership" vs. average of ratings pertaining to "good worker"	.43

The ratings for "good worker" correlate .77 with grades in the first quarter and .59 in the second quarter. The drop in correlation from the first to the second quarter is all the more significant in that the ratings were made about half-way through the second quarter. It is to be noted that these are the highest correlations with grades reported in this study and are in fact the only correlations that may be called "high" in the study.

The faculty assigned the members of the class who were finishing the two quarter course to one of seven classifications, three of which may be ignored as they had only from zero to five men assigned to them. The remaining four classifications with the average "good worker" ratings assigned them by students were

1. good apparatus man	7.77
2. interviewer	7.85
3. administration assistant	7.36
4. no good for personnel	5.80

The differences in rating between the last group and the first three are all statistically significant, for example, the difference between classes

* Grades have other values but in this case as far as we know differences in passing grades were not considered by the army in assignments to work.

3 and 4 is 1.56 with a critical ratio of 3.8.* Students and faculty agreed quite well as to who were the unsatisfactory members of the class, although there were some individual exceptions.

Students' opinions as to who are the hard workers in the class agreed with grades, which is quite natural as the grades of fellow students are generally known. But these opinions are not related particularly to the factors considered above, as the following correlations indicate

Rating on Good Worker vs. Intelligence	r = .187
Rating on Good Worker vs. Personnel Interest	r = .16
Rating on Good Worker vs. Psychologist Interest	r = .24
Rating on Good Worker vs. Morale Rating	r = .25

If scholastic grades are a good measure of "persistent energy on the job," "finishes work he begins" and "good assitant in research," then we may conclude that the average of five ratings by fellow students has fairly good validity (correlation of .59 and .77). We must certainly conclude that they have greater association with scholastic performance than do test measurements of intelligence, interest and morale.

Conclusion. The personnel-psychologist course had at least two criteria—passing the two quarter course, where faculty grades were the measure, and satisfactory performance on the job. This study is concerned with only the former of these two quite different criteria.

Among a group of men with at least a score of 115 AGCT and who had previously attended college, it made little or no difference as measured by scholastic achievement whether they were freshmen or seniors and whether they had had none or three courses in psychology. Graduate students and those who had had four or more courses in psychology did better work than the remainder.

Test scores of intelligence and interest proved to be slightly related to grades, morale scores less so. Superior men in intelligence earned 5/6 higher letter grade than inferior men during the first quarter. The same relationship held for psychologist interest on the Vocational Interest Blank. For the entire two quarters the differences fell to 1/2 letter grade in the former case and 2/3 letter grade in the latter. Men with superior scores on a morale scale were superior by 1/2 letter grade to those with inferior morale scores. The correlation here ranged from .20 to .30—too small to be of practical significance. Ratings by fellow students on what seemingly is "willingness to work" yielded correlations of .77 and .59 with grades in the first and second quarters, respectively.

It looks as though "willingness to work" was more important in this particular group of men than intelligence, interest and morale. Or pos-

* The differences between the four classes in terms of morale ratings are of the same order but of lesser degree, none being statistically significant.

sibly we should say that test measures of intelligence, interest and morale do not measure willingness to work.

Raising the minimum requirement in intelligence (115 AGCT) and requiring certain psychology and personnel interest scores would have eliminated too many men who did satisfactory scholastic work to be feasible. On the other hand, such requirements might prove to be desirable in the light of a two to five year follow-up.

Where soldiers are known to each other, ratings by them might aid in selecting a superior group, as their ratings correlated higher with grades than any other measure of proficiency.

The writer has always favored elective over required courses because the student has to decide that he will take the course and seemingly once he has so decided, he takes what comes with much better grace. In the same vein the writer believes these soldiers should have been given the opportunity of deciding whether they would take the personnel-psychology course or not. The validity of both these hunches needs to be established. We really ought to know how far drafting men affects achievement.

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BOOK REVIEWS

WOLFF, H. G., GASSER, H. S. & HINSEY, J. C. (Eds.) Pain. Baltimore: Williams & Wilkins, 1943. Pp. xii+468.

For the second time in ten years the Association for Research in Nervous and Mental Disease has devoted its annual meeting to the consideration of sensory mechanisms and their disturbances. The restriction of the present volume to pain reflects the recent revival of research interest in this field, due in part to the urgency of war-time need. In large measure this interest has been centered in Cornell University Medical School, especially in the work of Harold G. Wolff and his associates. It is therefore fitting that Dr. Wolff should have served as president of the association for this meeting, as chairman of the editorial committee, and as collaborator in six of the thirty-two papers presented. Half of these papers, it might be added, were contributed by members of various departments in Cornell University Medical School.

The volume opens with a concise summary of the striking researches of Hardy, Wolff, *et al.* on the pain threshold for radiant heat. This brief chapter reviews the evidence for their assertion that the perceptual pain threshold is virtually uniform in man, despite great variability in "reaction" to pain. This theme recurs in many papers throughout the book, although in the final chapter an important qualification is added by Wolff and Goodell. Attitude and suggestion are reported there to have raised pain thresholds as much as thirty percent in some subjects, contrary to results reported in their original publication. But the authors still maintain that if the subjects are carefully instructed in procedure, in the criteria of pain and in the maintenance of an attentive attitude, individual differences in thresholds are slight. This remarkable generalization has naturally caused psychologists to wonder whether or not the experimental conditions might not somehow have operated to mask individual differences in sensitivity. The original articles are not very explicit on the psychophysical procedure employed and the papers in this volume are still indefinite on this point. An ascending series of intensities of radiant heat was used, with "thirty to sixty seconds" between successive exposures. The time required for a single threshold determination is said to have been "usually less than two minutes." These two specifications would mean that as a rule only two to four "steps" were used in an ascending series of trials, and if these steps were gross enough a concentration of threshold measurements might well have occurred. This is only a possibility, however, and further research should be undertaken to determine the effects of systematic use of finer gradations of stimulus intensities.

It is possible to classify the thirty-two studies into five major groups, although there is some overlapping among the categories:

1. experimental studies of pain sensitivity, of anomalous types of pain and of localization (7 chs.);

2. studies of the peripheral and central mechanisms in pain (4 chs.);

3. clinical investigations of the character and causes of pains arising in different areas of the body (13 chs.);

4. studies of the effects of pain upon certain visceral functions (2 chs.);

5. studies in the management of pain by surgical, pharmacological and psychological means.

The contributions vary markedly in research value and in literary quality, but in most of them psychologists will find clues to their lack of success in providing a satisfactory scientific account of pain. At the risk of great oversimplification, two classes of these clues will be briefly discussed.

The psychologist's difficulties with pain have been manifold but many of them relate to the failure of pain to exhibit systematic correspondence to stimulus intensity. At least a partial explanation of this irregular behavior is suggested in the two chapters on the peripheral mechanisms in pain. Gasser's excellent discussion of pain-producing impulses in peripheral nerves presents clear evidence that there are two classes of pain fibers, corresponding to the "double pain responses to single stimuli which have been rediscovered a number of times." And Tower describes experiments which show that these two types of fibers are differently distributed in the skin: the fast-conducting, myelinated fibers in the epidermis and the slow-conducting unmyelinated fibers in the dermis. These facts, together with Tower's demonstration of the ramifying, plexiform distribution of the terminal branches of the pain receptor unit, probably account for much of the anomalous behavior of this black sheep of the sensory family. A stimulus applied to the skin would elicit not merely a complex pattern of nervous activity in the dual pain fibers, but would also affect touch or temperature fibers, or both. It is little wonder that psychologists have not been able to establish anything like the Weber function for such a mechanism.

But perhaps more important than the delineation of the complex character of the peripheral mechanism is the conception of pain as a general psychobiological function. This frame of reference is established by the emphasis of Wolff and his collaborators upon individual differences in "reaction" to pain, and the theme runs throughout the book. Yet there is no very sustained, systematic discussion of this point of view or of its implications for a psychology of personality. For the most part the argument is incidental and implicit, although it comes prominently to the surface in the paper which describes an amazing case of insensitivity to pain. In this chapter Kunkle and Chapman report the results of prolonged tests and experiments carried out upon a twenty-five year old corporal, of Italian ancestry, in the United States Army. Both his life history data and the laboratory results showed almost complete insensitivity to ordinarily painful stimuli. The authors believe that hysteria as an explanation was ruled out, that there was a genuine defect in "perception" of pain since many of the reflex "reactions" to pain were absent. (This result, incidentally, is at variance with the doctrine of Hardy and Wolff that the pain threshold is uniform in different individuals.) The perceptual defect in this subject was apparently associated with a poorly developed sensory vocabulary.

There are many other research and observational items which will unquestionably enrich the scientific version of pain. The relation of the cortex to the production and regulation of pain, for example, should be clarified by the chapter of Michelson on the effects of cortical lesions. He presents five cases in which irritation at the cortical level apparently produced pain, not as a thalamic release phenomenon but as a direct influence upon cortical tissue. There are other items in the book which are somewhat discouraging, such as the occasional revival of Head's somewhat archaic "protopathic-epicritic" hypothesis. But this lapse is challenged in the discussion which follows one of the papers, as are many other questionable assertions throughout the volume. The entire work is an impressive scientific production which should encourage psychologists to return to the problem of pain. And it should teach them that an adequate

methodology will probably conceive pain not as an isolated sensory dimension but as a complex psychosomatic function.

LYLE H. LANIER

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KLÜVER, HEINRICH, (Ed.) Visual Mechanisms. Biological Symposia Vol. VII. Lancaster, Pa.: The Jacques Cattell Press. 1942. Pp. viii+322, 1 plate.

The editor in his "Foreword" very aptly calls attention to the wide diversity of the problems in vision. The discussions in this symposium, though restricted to the biology of vision, attack the question from many widely different angles. Every paper is limited to a special problem, or group of problems, with which its writer had had direct experimental experience, yet they do more than present experimental evidence in the style and terms that would be used in reporting data in technical journals of the special fields. Instead, without sacrificing the precision of such data, the writers have interpreted them so that they become available to workers in adjacent fields. The reader must, of course, make his own over-all integration of the group of papers.

The symposium begins with a report of experiments on the *Energy Relations in Vision* by Selig Hecht. Determinations were made of the least amount of energy necessary for the subject to "see a flash" of short duration under dark adaptation (7). From his data Hecht concludes "that in order to see, it is necessary for only 1 quantum of light to be absorbed by each of 5 to 14 retinal rods," or "that 1 molecule of visual purple needs to be changed simultaneously in each of 5 to 14 rods, in order to produce a visual effect (13)." He argues that, in the liminal determination of this experiment where the quantal character of light is the limiting factor, "the properties of light itself limit and define the properties of vision (18)."

The next problem is that of the photochemistry of vision, two aspects of which are discussed in papers on *The Photochemistry of Visual Purple* by Arlington C. Krause and on *Visual Systems and the Vitamins A*, by George Wald. In the first of these, is presented a study of visual purple and its related carotenyl substances showing the known photo-reactions of several of them with their possible relations to the functions of the retina. The other paper extends the study of the photochemicals of the retina to show reactions of Vitamin A and absorption characteristics of the several retinal substances. E. Gellhorn discusses *Anoxia in Relation to the Visual System* thus maintaining touch with the chemical aspect of vision but noting certain of its effects by way of psychological (negative after-images) physiological (reflex) and physical (electroencephalographical) data.

Having left the photochemical aspect of vision, the symposium now takes up some of its physiological problems in *Visual Sensation and its Dependence on the Neurophysiology of the Optic Pathway* by S. H. Bartley. He attempts first to work out quantitative correlations of certain aspects of neurophysiology with the visual end-product. After that "certain ideas about the performance of the functional units in the visual pathway can be deduced from the details of sensation in connection with the overall records obtained from the pathway (8)." Finally "the aspects of visual experience for which no direct physiological correlates can be found must accrue from the relations of various activities." In such correlations, of course, the psychological data must be obtained with as careful methodology as the physiological.

The remaining seven papers tend toward anatomical and histological exami-

nation of the organic structures involved in vision with, of course, an emphasis upon the functions of those structures. T. J. Case discusses the *Alpha Waves in Relation to Structures Involved in Vision*, citing evidence from a number of cases with lesions in various cortical structures. W. H. Marshall and S. A. Talbot present *Recent Evidence for Neural Mechanisms in Vision Leading to a General Theory of Sensory Activity*. G. V. Borin, H. W. Garol and W. S. Mc Culloch contribute an experimental study of the *Functional Organization of the Occipital Lobe* in which by strychninization they demonstrate the functional distinction of 3 areas in the visual cortex of the chimpanzee viz. striate, parastriate and preoccipital. S. L. Polyak has condensed his work on the *Anatomy of the Retina* into 9 well-filled pages, and G. L. Walls has given a similar summary of *The Visual Cells and Their History*. H. Klüver, editor of the symposium, contributes a discussion of the *Functional Significance of the Geniculo-Striate System* and K. S. Lashley concludes the series with a consideration of *The Problem of Cerebral Organization in Vision*.

Quite as important as the positive contributions in these papers, are the criticisms that will occur to serious and experimentally minded readers, for questions so raised may be the starting points for new investigation. It is with this in mind that the reviewer ventures to point out typical considerations that might well be given further and other study. One must not forget, for example, that in the first paper Hecht is dealing only with dim or twilight vision, so that care must be taken if one infers anything from the data as to what may happen in daylight color vision. Hecht is perfectly clear on the fact but does not give the warning. Where psychological techniques enter into the experiment, there is reason to question the methods used. Judgments obtained by a method of adjustment in which the observer has considerable knowledge of the nature of the problem and the bearing of his reports have been generally rejected by psychologists as invalid. Mere convenience is not sufficient reason for using them. Likewise, the "threshold" is a well enough defined concept in psychology not to need a special definition in a particular problem. We are left wondering just what Hecht measured.

It is precisely where the biological observations impinge upon the psychological that stimulating questions are raised. For example, Bartley very definitely sets off "the experience of *brightness*" (88) from the "response to *intensity*" (101) of stimulus although he does not stick to it when he discusses "judgment of intensity" as brightness discrimination. Also it is questionable whether when an observer sees a "flash" from the "on-response" he is "without immediate consciousness of duration (89)." Certainly a "flash" is a distinctive durative perception. Marshall and Talbot also face the problem of the relation of "brightness to magnitude of electrical response (121)" and we would point out that the judgments of brightness should not be more casual than the measurements of electrical response. Not only are we not encouraged by the casualness of the correlation that "the 'off' response . . . signals a subjective sensation of darkness (121)" but we are impelled to point out that nowhere has anyone faced the question of the response correlated with sensory black. A consideration of the psychological fact that the black-gray-white series is not intensive but qualitative might suggest a new direction of physiological attack.

There is the other side of the picture as well. Psychologists who read the discussions of Polyak and of Wall can scarcely go back to the simple interpretations of retinal activity that is found in so many current textbooks. Oversimplification is less desirable than confession of ignorance. Klüver has been

at some pains to point out in the beginning of his article the fallacies of premature correlations which purport to speak the final word. He brings together, on the other hand phenomena of the central cortex and of stimulus conditions in the search for parallels in the two systems. This is a procedure that stimulates further investigation. What is true of the few cases specifically mentioned is, in general, true of the whole symposium. We shall profit by more such discussions.

We have one criticism of the form of publication that seems important. The usual custom of definitive running heads on the right hand pages has not been followed. This makes it difficult for a reader to orient himself in the text, especially since the various papers over-lap in their subject matter. It may not be necessary to follow a text-book type of subject indexing, but identification of every article by author or by title would greatly improve the book.

FORREST LEE DIMMICK

Hobart College.

LUCK, J. M. and HALL, V. E. (Ed.). Annual Review of Physiology. Stanford University, Annual Reviews, Inc., 1942. Pp. viii + 709.

In this volume is reviewed the research literature of physiology appearing in the two or three years prior to 1942 and especially between September, 1940, and August, 1941. There are 23 chapters, each dealing with a topic in which research has been active during this period and each written by one or more specialists in the particular field. Bibliographies of literature cited in the various reviews total about 4000 references. At the end of the volume is an author index of more than 4000 items and a subject index, 56 pages in length and containing about 6500 items.

Because of limitations of space, the volume represents a compromise between a detailed, critical treatment of selected subjects, on the one hand, and an all-inclusive classified bibliography, on the other hand. In general, an extremely comprehensive review of experimental physiology has been achieved, but many of the reviewers have had to select certain aspects of their subject, which appear to have made the most significant advances in the period of the review or which may be closest to their interest and competence, leaving other aspects of their topic for treatment by another reviewer in a later volume. The result is a well balanced treatment which, as reviews of this kind go, is remarkably readable and gives a good overall picture of what is going on in the respective fields.

Approximately half of the volume, since it is written by physiologists for physiologists, is of no interest to the psychologist except that, here and there, it contains brief treatments of such psychophysiological problems as: inheritance of neurotic behavior, physiological fields and gradients in ontogenetic development, inductive influences in embryonic differentiation, nerve-muscle specificity in behavior, pituitary and adrenal factors in the polydipsia of diabetes insipidus, pituitary and thyroid influences upon appetite, metabolism and hibernation behavior, metabolism of different brain structures, experimental hypertension, and factors in gastric motility.

The second half of the volume is made up largely of sections and chapters which the physiological psychologist will want to read either because they treat basic physiological problems or because they review the material of physiological psychology itself. In the first category is a three page section on physiological shock (Hertzman), *The Physiology of Reproduction* (Hisaw and Astwood), and *The Autonomic Nervous System* (Hare and Hinsey). Also of this

background character but especially worth reading are the chapters on *Electrophysiology* (Girard), *The Spinal Cord and Reflex Action* (Ruch), and *The Central Nervous System* (Hines). This latter chapter is an excellent review of recent work on physiological anatomy of the nervous system as well as of work in the neural mechanisms of sensory discrimination and learning.

Reviews of material in physiological psychology proper are to be found in a section of *The Physiology of the Skin* (Baird, Lever, and Spies), which considers the physiological basis of cutaneous perception, *Sense Organs* (Hartline), which is oriented in large part toward psychophysiological problems of perception, and *Physiological Psychology* (Richter). This latter chapter may disappoint the reader, on first glance, because it does not pretend to cover the field even for the period of review but is limited to the problem of total self-regulatory functions of the organism as seen principally in dietary selection. This chapter makes a great contribution, however, in the breadth and detail of its treatment of this recently very active and fruitful field of psychophysiological research.

When one considers the limitations of space and the fact that such a volume is only one in a series, in which the topics selected and the emphasis given to each can be, and are, varied from year to year, there is no important criticism which can be made of it. It constitutes, on the other hand, an indispensable reference book for the physiological psychologist, as well as the physiologist, for it will enable him to keep up with current work in his field with much greater economy and surity than he otherwise could, no matter how ardent his attempts to follow the literature directly or by means of other available reviewing and abstracting sources. Indeed, with such a volume as this, he can more easily keep abreast of physiology than of psychology, since psychologists have not yet followed this excellent example by initiating an Annual Review of Psychology.

CLIFFORD T. MORGAN.

Harvard University.

ROBERTS, W. H. Psychology You Can Use. New York: Harcourt, Brace, 1943. Pp. vi + 246.

The title of this book suggests another in a fairly long list of popular books on the social and emotional aspects of personality. It is however a layman's general psychology, with only one short concluding chapter given to personal adjustment. The remaining eighteen chapters are allotted as follows: one chapter on habit, five on sensation, four on attention and perception, one on feeling and emotion, three on reflexes, instincts, and nature-nurture, and four on intelligence and intellective processes.

The discussion of facts and principles, particularly the section on sensory experience, is replete with homely but telling illustrations drawn from daily experience and from various kinds of employment. Certain of the schematic diagrams of sensory modalities and a number of the classical experiments in psychology are described, most of them being attributed to their authors by name. Occasional use of dates serves to orient the reader to the recent development of the science. Throughout the book, popular superstitions and beliefs about psychological phenomena are discounted or disproved by evidence and illustration, though no mention of psychical phenomena, or "mysteries of the mind," is made.

The author's style is simple, yet dignified and avoids both the sensational and the pedantic. He introduces technical words throughout the text and gen-

erally defines them adequately for the extent to which he uses them. The discussion makes no reference by name to "schools" or to professional debates on psychological issues; the description of principle is eclectic and frankly admits to a number of unsolved problems. The inclusion of numerous simple experiments which the reader is enjoined to try maintains interest quite effectively.

The book will disappoint the general reader who is looking for another source to help him "psychoanalyze" himself. The scientific purist will be critical of the error in the Muller-Lyer illusion on page 117 and of numerous over-simplifications as, for example, the casual reference to dogs going "crazy" when faced with too difficult discriminations in a conditioning problem, and the comparison of this behavior to the behavior of certain human beings in difficult choice situations. The reviewer, however, welcomes this text as basically sound and as a refreshing variation from the "self-salesman" type of popular, applied psychology. In conjunction with such a reference as *Psychology for the Fighting Man*, where more social applications of psychology are made, this text should be widely useful in general education, either in the high school or junior college.

DALE B. HARRIS.

University of Minnesota.

JACOBI, JOLAN. The Psychology of Jung. New Haven: Yale University Press, 1943. Pp. xi+166.

This is the first formal "synopsis" of Jungian thought, introduced in a foreword by Jung; it is a translation of the 1939 German original. In spite of Jung's 105 German and 35 English titles (all listed in bibliography), his name has too long been suggestive, in American psychology, of merely an assortment of ideas: introvert-extrovert, character typology, word association tests, the "collective unconscious" and rebel psychoanalysis.

Freud has taken occasion to refer to Jung as one of his most brilliant students. While Jacobi's synthesis specifically ignores the relation of Jung's contributions to the course of psychoanalytic thought in general (x), she does present a concise gathering of "all essential points," his basic theoretical formulations and definitions, organized into a system—a system of psychotherapy "a way of healing (58)." The section on "Practical Application" constitutes over sixty per cent of the book. Such organization, primarily around the therapeutic process of Jungian analysis, proves to be an effective procedure for a sequential unfolding of his conceptual "layers of personality," as well as of his principles of interpretation. We are thus led thru the positive, curative stages, "the process of Individuation," to the concept of the *Self*. The doctrine of the Self contains the clues to Jung's basic philosophic orientation, as well as to his diversified and controversial writings on religion, mythology, and mysticism.

Psychoanalytic formulations have a curious way of losing their quality of empirical conviction for many, when too removed from the analytic process, the clinical data; both Jung and Jacobi warn: " . . . only he who has had the experience is in a position to comprehend . . . (120)." Unfortunately, little case material is included, perhaps for brevity's sake; however, there are 17 schematic diagrams which are quite helpful in illustrating the typologies and structures of personality as the discussion grows in complexity. These drawings do not, however, take us to the dynamic process of Individuation, which is described as the freeing of the Self to participate more freely in the "collective unconscious" while somehow managing everyday adjustments.

Jung's original contributions derive mostly from the "transcendant, higher plane" of "psyche integrated into the Self (127)." He finds structural parallels in the Mandalas (Oriental symbolic representations), in Yoga forms, in Jesuit exercises, in Buddhist rituals, in the philosophy of Medieval Alchemy; and he finally makes a psychotherapeutic appeal to faith and to the irrational. The "highest task" of "Self-realization" is achieved when "the meaning of life no longer lies in the ego (143)." This philosophic orientation may explain the almost total disregard for the dynamics of personality development in the stages prior to "Self-realization"; Jung apparently is not interested in the developmental parallels of modes of adjustment in infancy, childhood, adolescence, or early adulthood. He evades the problem of individual differences in motivation, personality types, and styles of adjustment; his terms for the source of these differences are: "constitutionally destined," "naturally given," "born." Jung's hypotheses on heredity and development are scientific sorespots today. Jacobi's presentation allows these theoretical weaknesses to stand out in relief.

What is thus clear from Jacobi's "synthetic" formulations is the deviational character of Jungian ideas, from the body of psychoanalytic thinking, especially for the problems of emotional growth. He is not a competitor to Freud; his specialization is with certain phenomena more readily related to the somewhat more approachable concepts of *sublimation*, *superego*, and to certain Gestalt and Neo-platonic formulations about basic structural principles within everyday realities. Jung's social philosophy takes off from his criticism of mundane, egotistic, over-rational civilization and leads to a dangerously undemocratic dismissal of the body politic: "for the masses are blind beasts (144)." His social psychology is particularly problematic, on methodological grounds alone. But Jacobi's report is intended as a sympathetic synthesis; hence she avoids dispute and controversy.

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NOTES AND NEWS

WALTER TAYLOR MARVIN succumbed to a heart attack, May 26, at the age of seventy-two years. Dr. Marvin had served as assistant in philosophy, Columbia University (1898–99); as instructor and assistant professor of philosophy and psychology, Western Reserve University (1899–1905); as assistant professor of psychology and philosophy, Princeton University (1905–10); and as professor of psychology and philosophy (since 1910), dean of the faculty (1921–25), and dean of the College of Arts and Sciences (since 1925) of Rutgers University.

Columbia University has announced the promotion of HENRY E. GARRETT, professor of psychology, to the headship of the department of psychology.

A. S. RAUBENHEIMER, dean of the College of Arts and Sciences, University of Southern California, was elected president of the Western College Association at the spring meeting, May 6.

JOSEPH MILLER, director of guidance of the Wilkes-Barre Public schools has been appointed director of the Child Study Institute connected with the Juvenile Court of Toledo, Ohio.

S. STANSFELD SARGENT has been promoted from an instructorship to an assistant professorship in psychology at Columbia University.

F. A. FREDENBURGH has been appointed personnel director of Gimbel Brothers (Philadelphia), one of the largest department stores in the country. Dr. Fredenburgh was formerly advisor of men, College of the City of New York (N. Y.).

LUCIEN WARNER, formerly with the Office of War Information, has joined the Marketing Research Department of *Life* Magazine as associate director of research.

FRANCIS W. HIBLER has resigned as associate professor of psychology at Illinois State Normal University, to accept a position as consulting psychologist with the firm of Stevens, Jordan and Harrison, Management Engineers.

THEODORE R. SARBIN has resigned his position as director of education and research at the Lincoln State School and Colony (Lincoln, Ill.) to devote his full time to private practice, with an office at 55 E. Washington Street, Chicago.

MILTON A. SAFFIR announces the removal of the offices of the Psychological Guidance Center, of which he is director, to the Pittsfield Building, 55 E. Washington Street, Chicago. This Center provides psychological services for aptitude testing and vocational guidance, for psychometric examinations, for psychological service to schools, and for counselling on the psychological problems of children, parents, young people, and adults.

WALTER R. MILES, professor of psychology at Yale University, at a meeting on April 20 of the Iowa State College Chapter of the Society of Sigma Xi, gave a lecture entitled "Psychology and Military Aviation." He gave a similar lecture on April 20 before the Chicago Psychological Club, meeting at Northwestern University.

WILLIAM E. BLATZ, professor of child psychology and director of the Institute of Child Study, University of Toronto, has been appointed guest professor at the Iowa State College of Agriculture and Mechanic Arts (Ames) for the period, June 26–July 14.

WILBERT SCOTT RAY, professor of psychology, Hillsdale (Mich.) College, was recently appointed chairman of the department of psychology, Adelphi College, Garden City, N. Y.

MARY B. EYRE, professor of psychology, Scripps College (Claremont, Calif.), will retire, July 1, after thirteen years as head of the division of psychology. Miss Eyre will continue to give a course in psychology and child growth and development at Claremont Colleges, the graduate school of the associated colleges.

The 1944 edition of the Bibliography of Morale, compiled by BENJAMIN CHUBAK, which was published last year by the War Service Committee of the SPSSI at Harvard University, is now available. It lists books and periodical articles which have appeared in scholarly and popular journals on the subject of Morale and Military psychology for the years 1937–1943. Many items are annotated. An index is provided for ready reference. Copies may be obtained at $1.00 by writing to the compiler, Benjamin Chubak, at 5–76th Street, North Bergen, New Jersey.

On May 13, the University of Kentucky sponsored a Conference on Industrial Psychology at the Lafayette Hotel in Lexington. The conference topics dealt with the selection and training of young men and women for positions in industrial psychology. Participating were a number of personnel officers and executive officers of industrial and business plants. Many of the leading manufacturers and business men of the state attended. HENRY BEAUMONT, associate professor of psychology, was instrumental in arranging the conference. Persons interested in the conference or the recent training program in industrial psychology established in the University of Kentucky, may obtain information by writing to him.

The Board of Higher Education of New York City has authorized the Department of Psychology of The City College to offer graduate work. A committee of the department has set up a plan for conferring the M.A. degree, emphasizing individual work under staff guidance rather than the addition of graduate courses. Laboratory and field research, a thesis for each major research project, and preparation for a comprehensive examination will constitute important phases of the year's work. Candidates should apply to Professor J. G. PEATMAN, Secretary of the Committee on Graduate Work, Department of Psychology.

Encyclopedia of Psychology. The Philosophical Library announces the sponsorship of an encyclopedia of psychology to be published in about a year. The volume will be designed as a library reference book, and the articles will be written to the level of advanced students. The editor invites suggestions which will be helpful in making a scholarly, worth-while addition to the science of psychology. Correspondence should be addressed to PHILIP LAWRENCE HARRIMAN, Department of Psychology, Bucknell University, Lewisburg, Pennsylvania.

Examination for School Psychologist. The Board of Examiners of the Board of Education, Brooklyn, New York, announces examinations for a School Psychologist, open to either men or women who have a Bachelor's degree and in addition 30 semester hours in approved graduate courses; the total preparation, both undergraduate and graduate, to include a minimum of 52 semester hours in approved courses for training as School Psychologist. The experience requirement is two years of experience as psychologist in an approved organization or clinic for the study and treatment of mental disabilities and learning difficulties of children. Applicants shall be at least 21 years of age by February 1, 1945, and shall not have passed their 41st birthday on the date of the official announcement of the examination, which is June 15th. The initial salary is $2148

per annum which rises with 13 annual increments to a maximum of $4104. All preparation and experience requirements must be made by February 1, 1945. The examination will include a written test, an interview and personality test, a health examination and probably a performance test. Inquires should be addressed to the *Committee on Child Guidance Bureau Licenses, Board of Examiners, 110 Livingston Street, Brooklyn 2, N. Y.*

Resolutions of the New York State Association for Applied Psychology. With respect to the proposed reorganization of the APA and the attendant dissolution of the AAAP, the Executive Committee of the New York State Association for Applied Psychology unanimously approved the following resolutions at a meeting on May 19, which have been transmitted by GLADYS TALLMAN, the *Secretary:*

1. Postponement of final decision on the proposed merger is recommended until there has been opportunity for the full membership of area organizations and the APA and the AAAP to meet and consider the desirability and implications of the plan. This will be impossible so long as many members are in the Armed Forces and there are war-time restrictions on travel.

2. The need is recognized not only for the war emergency, but also for the post-war period, of a central clearing house and *Office of Psychological Personnel* to function for existing psychological societies, whether or not the proposed merger is eventually approved. The maintenance of such a central office has been one of the chief arguments advanced by advocates of the merger. There is no question but that such an office needs to be continued. Until, when and if, the merger takes place, a central office could continue to be financially supported by the national organizations, with the responsibility for its functions and personnel being delegated to a joint committee composed of members representing existing national organizations.

3. The importance of *direct representation* of affiliate organizations on the proposed Council of Representatives is reaffirmed and we recommend that the question of possible discrimination against existing affiliate organizations with less than 50 members be definitely removed; we urge their representation, provided qualitative conditions of membership are satisfied. Furthermore, we emphasize that the present and future functions of the present Board of Affiliates of the AAAP could be satisfactorily exercised by a standing committee of the Council of Representatives of the proposed national organization, with the committee's membership composed of the representatives from affiliated societies.